Research on 'Quality' in Online Experiences for Museum Users

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RÉSEAU CANADIEN D'INFORMATION SUR LE PATRIMOINE

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By

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Introduction

About the Virtual Museum of Canada

The Virtual Museum of Canada (VMC) is a strong online presence for Canadian museums. **The Canadian Heritage Information Network (CHIN)** is constantly striving for high quality of content in creating and producing all VMC products. In 2001, the VMC Investment Program was established to help heritage institutions across Canada produce content for the Web and make it available to all Canadians.

As described in **Producing Online Heritage Projects**, CHIN focuses on skills development for the creation, management, and presentation of digital content, targeted specifically at building the capacity of the heritage community. CHIN also actively helps smaller museums get involved in the production process, and encourages all heritage institutions to work together while staying abreast of new technological developments and their implications for heritage and the Web.

What is a Virtual Museum?

Werner Schweibenz, of the School of Information Science, University of Saarland in Germany has defined a 'virtual museum' as a logically related collection of digital objects composed in a variety of media. Because of its capacity to provide connectedness and various points of access, it lends itself to transcending traditional methods of communicating and being flexible toward the needs and interests of visitors who are interacting with it. A virtual museum has no real place or space, and its objects and related information can be disseminated all over the world. Schweibenz argues that a virtual museum is essentially a museum without walls. It "opens itself to an interactive dialogue with visitors offering them connected digital objects and information that is readily accessible from outside the museum" (Schweibenz, 1998, p. 5).

Virtual Exhibits

How is a Virtual Exhibit Different from an Exhibit in a Museum?
Different than visiting a physical exhibit of objects (e.g., collected artifacts, live specimens, or scientific phenomena), individuals browsing a Virtual Exhibit find their own meanings by using state of the art animation, sound, and search capabilities. They may experience a range of emotions in response to beauty, an evocative atmosphere, new learning, and interactivity. A Virtual Exhibit provides an online entrance hall for a global audience in a presentation that brings to life the potential dynamism of objects and their stories.

Goal of 'Quality' in Online Experiences for Museum Users

The goal of CHIN's research project on *'Quality' in Online Experiences for Museum Users* was to ensure consistency through VMC's content and interface, and to determine:

1. What impacts 'quality' in online museum projects?
2. How to measure quality through an analysis of existing online museum products in the Virtual Museum portal?

Motivation and Learning on Museum Web Sites

People who visit physical museums, or who visit a museum's Web site, may become curious or interested to explore content because of 'a hook' that initially arouses their curiosity and interest (Csikszentmihalyi and Hermanson, 1995). A person might be motivated to pursue further learning when complex information is presented in a way that is enjoyable and intrinsically rewarding. The learning experience can involve the whole person – the intellectual, sensory, emotional, and spiritual faculties. Typically, intrinsic motivation rather than external reward drives people to visit an online or on-site exhibition.

'Quality' in online museum experiences depends, in part, on what motivates individuals to search for and browse a museum Web site. What engages them to explore the site more deeply? What helps them to better understand the online content after their online experience?

Genevieve Bell (2001), an anthropologist at Intel Corporation, discusses ecological studies of real and virtual museum visits. In an online interview she explained, "Museums were starting to think about how you could use the Internet, not just to replicate the museum online, but also to give people the same kind of rich experience you get in visiting a museum. They were saying, 'Okay, part of what going to a museum is about is that it is kind of a rich experience. It is an intellectual engagement, and an engagement of the senses. It is some sense of being moved past who *you* are.' You can use the Internet to do that in ways that are profoundly different than in real space. People had started to think really creatively about that" (p. 2, *http://www.cimi.org/wg/awareness/Awareness_Bell_3.pdf*).

When planning for museum experiences there are different approaches to help people understand 'rich topics' (Gardner, 1999).

- Multiple points of entry bring visitors into an on-site or online exhibition so that they want to experience and learn about the museum's objects and ideas (e.g., through narrative, numerical, logical, existential, foundational, 'hands-on,' or interpersonal entry points).

- Powerful analogies and metaphors enable visitors to make connections and associations, which make the experience personally meaningful.
- Multiple representations of core themes provide interpretation in different ways and in different media (e.g., natural language, logical analysis, graphic form, audio/video, film, arts media, or live interpretation).

At the 2001 American Association of Museums (AAM) Annual Meeting during a session called, "Setting a Course through Cyberspace" (Falk, Steinbach, Goldman, & Sayre, 2001), speakers affirmed that Web sites have been largely functional to date and little is known about the Web's potential to extend the learning reach of museums. What is particularly challenging is finding out:

What meaning online visitors are making.
- How virtual museum sites contribute to what people know and understand.
- Why people come to the Web site and what they experience.
- Tracking who is filling out, and not filling out, online surveys that are attached to Web sites.

The nature of learning online and outcomes of the virtual experience.
To date, evaluation of Web sites has been based on just the basic facts of online experiences rather than the nature of learning and outcomes. The presenters in this session talked about three types of Web sites:

- Brochure or marketing sites
- Sites with a research mission
- Sites with an education mission.

Learning outcomes or expected learning after an online experience.
These could be:

- New understanding, attitudes and behaviours
- Aesthetic experiences
- Critical inquiry
- Personal learning or 'museum savvy'

Constructivism & Online Museum Experiences

Since the late 1990s, there has been an increasing focus on 'Constructivism' by museum educators and audience researchers attempting to discover how museum visitors construct personal meaning during a visit to a physical museum. This concept seems even more important in thinking about the individual and unique ways that museum users explore museum Web sites.

Jeffery-Clay (1998) believes that museums are ideal constructivist environments because they allow visitors to explore freely, move at their own pace, interact and share experiences with groups, and examine and expand their own understanding. Hooper-Greenhill (2000) explains, "Individuals search for meaning, look for patterns, try to invest their experience with significance" (p. 118). Visitors interpret objects in museums through a 'reading' or looking, combined with sensory experiences (e.g., touching or smelling), resulting in both spoken and unspoken cognitive and emotional responses. Carr (2003) believes in the importance of "good questions" as part of crafting experiences, memories, and outcomes of museum experiences. "Human beings craft their lives through questions; for all of our lives, questions lead our steps. Questions confirm our alliances. Questions frame our trusts. Questions lead our thoughts" (p. 96).

What are the implications of how people construct meaning from their museum online experiences? Teather and Wilhelm (1999) explore how some museum Web sites are inviting visitors to construct their own knowledge. "These sites work to facilitate and encourage multiple voices and the exchange of stories both outside and inside the institution and between staff and visitors" (p. 138). They argue that the constructivist Web site employs a wide range of active learning approaches, presents a wide range of points of view, and provides many entry points, with no specific path and no identified beginning and end. It enables online visitors to connect with objects and ideas through a range of activities and experiences related to their life experiences.

Frost (2002) believes that technologies make it possible for learners to build on objects to develop new information sources tailored to their needs, creating their own information objects. "The collaborative potential of digital technologies also facilitates sharing and exchange of communication about objects. Together, both real and virtual object-centered learning can contribute to a richer educational experience" (p. 80). Frost finds that digital communities are particularly dynamic because the users can become creators as well as consumers of information objects. However, viewing materials online can be both socially enriching and isolating. "The Internet can foster community, but it can also facilitate individual, one-on-one engagement between people and the information objects found on their computers, leaving out the intermediary. This direct interaction with information makes it easier to connect to resources at our own convenience, providing we have appropriate means of access to computers and connectivity" (p. 85).

Schweibenz (1998) sees the Internet as a knowledge base and communication system. He cites Hoptman's belief in 1992 that connectedness is the basic feature of the virtual museum, "as it seeks to describe the interrelated and interdisciplinary presentation of museum information with the help of the integrated media. Connectedness is the quality that allows the 'virtual museum' to transcend the abilities of the traditional museum in presenting information." Connectedness gives visitors the opportunity to focus on their special interests "by pursuing them in an interactive dialogue with the museum. This is an important step in the development from the traditional museum to the museum of the future" (Schweibenz, 1998, p. 4).

What Impacts 'Quality' in Online Museum Projects?

In CHIN's research project on *'Quality' in Online Experiences for Museum Users*, some factors that have impacted on the quality of user experience are:

- **A development process that is sensitive to the needs of its users** and works from the users' perspective. Targeting a youth-focused market can be very effective for VMC products.

- **Using a more constructivist user-oriented approach** helps partners to think about exhibiting collections in the virtual medium rather than using traditional exhibitry.

- **Working with multimedia developers** provides opportunities for museums to push the boundaries of traditional curatorial practice, providing opportunities to practice, or learn about, writing for users in an online medium.

- **Unique content and global appeal** seems to bring the most traffic to VMC products, particularly through easy access on the first page of a search engine.

- **Having different language versions** enable more diverse users to have access to VMC products globally.

- **Clear navigation and site structure** plays a key role in quality. Presenting information intuitively will help users find what they are looking for.

- **Rich images and content using databases** help to organize the enormous amount of images and content from multiple museums and heritage organizations involved in international partnerships. Database-driven Web sites enable users to dynamically access rich content and images based on their own choice.

- **Good partnerships and working relationships** with national, international museums, heritage organization partners, and savvy multimedia companies enable all parties involved the opportunity to exchange ideas, and learn from one another.

- **Marketing of regions across Canada** helps to promote tourism to these areas in part because of press at launches, Marketing, and Featuring.

- **Evaluating expectations and objectives of development teams** measures the success of a VMC product.

Virtual Museum of Canada Products Explored in this Research Project

Figure 1: List of VMC Products

Name of Site	Languages	Launch Date	Additional Technology
Christmas Traditions in France and in Canada	E, F	1995	
Haida Spirits of the Sea	E, F, P, S, H	1998	Java, FLA
Butterflies North and South	E, F, S	1998	Java, QT, RP
Yukon Photographers	E, F	2001	
Explore Herschel Island!	E, F, G	2001	
Panoramas: The North American Landscape in Art	E, F, S	2001	
Perspectives: Women Artists in North America	E, F, S	2002	QT
Staying in Tune	E, F	1999	Shockwave
Astonishing World of Musical Instruments	E, F	2001	QT
Hockey: A Nation's Passion	E, F	2002	WM, RP, FLA
Safe Trax	E, F	2003	FLA
The Adventure Train	E, F	2003	FLA, RP

Languages: E=English, F=French, G=German, H=Haida, P=Portuguese, S=Spanish

Technology: FLA=Flash, QT=Quick Time, RP=Real Player, SW=Shockwave, WM=Windows Media

Online Experiences and User Interaction

The development teams of VMC products interact with online users in a variety of ways:

Sharing / Obtaining Information

Haida Spirits of the Sea: Raising awareness, sharing the living culture of the Haida people.

Butterflies North and South: Identifying butterflies and moths found in user's backyard.

Staying in Tune: Obtaining information about musical instruments around the world.

Learning / Experience

Butterflies North and *South*: Providing information-based games.

Panoramas and *Perspectives*: Offering content based on user interest, providing an element of surprise, giving options, and dynamically presenting works based on a user's choices.

Experimenting

Staying in Tune: Experimenting through hearing instruments and playing games on the site.

Panoramas and *Perspectives*: Exploring new ideas and perspectives; the Curator's Choice section allows a user to hear a curator speak about the artwork.

Exploring a Database

Panoramas and *Perspectives*: Providing database collections, building a site where more individuals can move through and learn about their interests.

Exchanging Ideas

Panoramas and *Perspectives*: Exchanging ideas during the creation and development process, and after getting Feedback from users.

Explore Herschel Island! and *Yukon Photographers*: Sharing information on listservs with groups of people who have common interests.

Experiencing Rich Resources

Panoramas and *Perspectives*: Integrating multimedia with resource rich sites and non-invasive plug-ins.

Explore Herschel Island! and *Yukon Photographers*: Providing rich content, images, and variety to engage users on different levels.

Potential 'Best Practices' in Developing Quality in Online VMC Experiences

When VMC products are successful in having quality in online experiences, what should be considered in the development process? Based on the interview sample, the best practices that seemed most important to project managers and multimedia included:

- Common vision, clear goals and objectives, consistency, and a solid structure.

- Topics chosen that have clear and simple, yet emotional and powerful stories.

- Dedicated individuals with a love and passion for the product they are developing, and collaborative partnerships.

- Adequate time and budget to develop as high a quality product as possible.

- Navigation and access to provide a clear organization of information and images.

- Thinking in virtual rather than physical medium.

- Products that are user-focused, useful, and used by online visitors.

- Leading edge technology sympathetic to the content and messages of partners.

- Production process considerations that ensure accessibility.

- Maintenance of sites and after launch follow-up:
  - Evaluation of the process, team, user statistics, and Feedback messages.
  - Flexibility in design to make changes based on feedback from partners and users.
  - Building on learning for future collaborative projects.
  - Sharing lessons learned with partner heritage organizations and museums and multimedia companies.

Project Concept

Common vision, clear goals, objectives, consistency:

- A common vision at the outset, which is very clearly defined.
- Stronger producers with a vision, or an *auteur* model with a visionary is the answer to making better sites where there are no boundaries (e.g., a project driven by an individual with a great idea who finds people to help build it and gets funding from corporations and government to push forward a small number of national projects).
- The framework is in place very early in the project, and all decisions are made around learning objectives.
- Partners identify a theme, organize information, and create a schema.
- Being fastidious in the development process, not taking anything for granted, not cutting corners, and doing what it takes to get the job done.
- Consistency, a solid structure in place, and a Web site for collaborators on which all the documents are provided at all times (i.e., eliminating problems like Internet communication breaks, and facilitating more content contribution and sharing of documents).
- Partner organizations' primary goals are to learn as much as they can about components, design, and content, share knowledge, and take ownership of their product. One of the important outcomes should be that partners learn how to create more accessible online as well as on-site exhibits for their visitors.

Topics with clear and simple yet emotional and powerful stories:

- Making the story clear, simple, and compelling. A good story and theme are very important (e.g., the stories and images on the *Yukon Photographers* site are very emotional, powerful, and touching – photos indicate that after men found gold their dress became richer and there was a look of hope on their faces).
- Giving users a chance for personal expression (i.e., the development team going a little bit further than just coming up with a theme, following a framework, establishing structure, obtaining collections, and putting the collections online).
- Providing credibility of online information, and developing sites that are not too narrow, academic, or institutional focused.

- Choosing VMC products that are more issues-based and asking more in-depth questions with content that is politically and socially meaningful.

Dedicated individuals and collaborative partnerships:
- The will, love, and passion of the people working on the product.
- Partnership as the key to success, and having people want to go beyond a sense of duty.
- Including on a team international as well as national partners, and dedicated individuals (e.g., huge consortiums have produced excellent sites when there is a rich group with lots of ideas).
- A collaborative approach to determine the development and production path.
- Lots of discussion early in the creative process and the team meeting together, preferably in person, and working things out (i.e., the development team accomplishes in one or two days what they can in conference calls over one month).
- Develop learning objectives as a project team (i.e., specific things to get across), and sites that are not purely entertainment.

Planning

Adequate time and budget:
- A comfortable budget and more time to develop and produce VMC products (i.e., to build something that is attractive, include the research needed to develop the content, develop the design, and find new ways of developing an architecture that is interesting and lively).
- A longer development cycle and production window in large projects where more partners are involved.
- Allowing time and budget to prototype and do focus group testing.
- Discussion and consensus-building between and among partners with face-to-face meetings where the team works things out together early in the creative process.
- Multimedia companies, as well as project managers, managing the scope of a project, timelines, and the company's efforts. Multimedia developers tend to have more of a technological advisory role, and partners take the lead in conceptualizing and developing the approach to a VMC product.

Design

Navigation and access with clear organization of information and images:
- Clear, easy to understand, and logical navigation. If users need to step back to figure out how to move forward, you lose them.
- Simplicity often works very well.

- Think about best access to content for target audiences.

- Information has to be broken up so it does not overwhelm users (e.g., using chronology or metaphor). It is better to fragment text to make it more readable.

- Offer a variety of choices of multimedia files.

- Determine how users can best access sites with large amounts of images and content.

- Organize information, create a schema, and develop clear, easy to understand, and logical navigation.

- Break up information so it does not overwhelm users (e.g., using chronology, or powerful personal stories or metaphors).

Thinking in virtual medium:

- Partners think in the virtual medium rather than think in terms of a physical exhibition. They learn how to create a museum experience for visitors in a virtual, online medium, and push the boundaries of traditional curatorial practice.

- Experiment with things that no one has done to help advance the medium (e.g., new technology, such as holography to move from a 2-D to a 3-D experience).

- Leverage 'dynamic content management technologies' to get users coming back. When all the time and investment are put into producing VMC products, Virtual Exhibits should not be built to be one-off sites with a shelf life of a year after they are built. Historical, informative types of sites tend to slowly retire with utilization dropping off (e.g., in a case like the *Butterflies* site, new species and new facts are always being discovered). Different generations of Web sites offer different levels of designs.

- Develop the VMC product as a virtual medium, which is user-oriented rather than a physical exhibit, which is object-oriented.

Products that are user-focused, useful, and used:

- Establish user requirements at the beginning of a project with a clear idea of whom the development team is trying to reach, what they are trying to give to target users, and what users might be trying to get from the VMC product. Questions to consider include:

  - How are users going to use the site?

  - What will they try to get out of it?

  - What are users going to be trying to do?

  - What is the development and production team trying to do?

- Offer a viewpoint and a product that is more user-oriented than object-oriented.

- Develop unique sites and experiences that individual users choose to have based on their interests. Multiple types of VMC products are needed within each site because users have different moods when they are surfing the Web at different times (e.g., escapism, learning, or entertainment). Different things reach different people in different ways at different times.

- Create something dynamic and fluid, which relates to a sense of season and time period as well as being connected to an institutional exhibit. The experiences users could have need to be identified at the outset, as well as opportunities that will give users a reason to come back to further explore the site.

- Provide intellectually satisfying online challenges for users (e.g., a quiz). Individuals will take time to work on the challenge, and if they invest time they will want a reward (e.g., to learn something).

- Consult target users to find out their user requirements (rather than guessing what they might be) and check regularly with users before the site is done (i.e., more front end and formative evaluation by launching an idea, seeing what users want, and observing their reaction).

- Measure success by determining whether a product has been deemed useful and continues to be used by users.

Leading edge technology sympathetic to content:

- Use technology that is sympathetic to content and the messages that partners are trying to convey (e.g., using QuickTime to display a transformation mask on *Haida Spirits of the Sea* with time lapse sequencing to open the mask and reveal the transformation).

- Take advantage of leading edge technology but be careful not to be exclusionary by making content broadly available to as vast an audience as possible.

- Develop a technical plan to manage the content and apply the technologies.

- Assess technology capabilities of partner heritage organizations and museums, and resources required where partners have limited technological capability.

Production

The production process:

- W3C accessibility standards for persons with disabilities are a set of regulations that developers need to follow for VMC products (*http://www.w3.org/MarkUp*). Target browsers standards and limitations of the VMC server's technology as the host site tend to limit the pushing of conceptual boundaries. The CHIN server can limit technology possibilities for VMC products, which inhibits the user experience.

- Plug-ins need to be available for users to enjoy all the elements of a site. Giving users the technology that they prefer (e.g., QuickTime for Mac users, and Windows Media Player for PC users) provides online visitors with choice of technology and reduces initial frustration accessing content.

- For school presentations of an interactive game (e.g., Transport Canada was planning to use *Safe Trax* as a visual aid when they went into schools to talk about rules, regulations, safety, and trespassing), the content could be tailored to be more effective in a classroom environment rather than a one-on-one experience.

- Involving young people in the creation and development process requires finding ways to keep them motivated, stimulated, and interested in working on the project. Taking ownership of their section of the project helps them to feel proud of the product they have helped to produce.

- Integrating Interns into the project is an important opportunity for the Interns but can be challenging for multimedia developers. Interns tend to have a limited level of experience and require more time for mentoring.

Maintenance

After launch follow-up:
Evaluation of the process, team, user statistics, and Feedback messages:

- A feeling that partners have accomplished something on many fronts – they got the story out, promoted the museum community, and showcased the partners' collections.

- Evaluation of the team, and bringing in new team members for follow-up projects (e.g., the development of the Yukon group's VMC products).

- Examination of Feedback messages over multiple exhibits to see where gaps are and what people are asking for. Email is a powerful feedback source that isn't being used enough. When evaluating Feedback messages, if users accessed files 1,000 times and there are only 10 emails, there probably are not a lot of problems.

Flexibility in design to make changes based on feedback from partners and users:

- Build in flexibility in design, and the ability for staff to quickly make revisions. Although the content is accurate at the time the site is launched, it is open for different interpretations, ongoing debates, and information sharing. User feed back may require correcting content when users report inaccuracies.

Building on learnings for future collaborative projects:

- The success of *Haida Spirits of the Sea* led the way for *Our World – Our Way of Life*. Indian and Northern Affairs point to the first Web site as one of their exemplary sites and use the materials for their outreach programs.

- The Yukon group's next Web sites will use the search model the VMC has developed. An image will come up after a search request with a short description of the site, what type of plug-in programs users need to explore them (e.g., Flash), and links to related Yukon sites.

Sharing lessons learned with partner heritage organizations and museums:

- Share lessons learned with the community by writing up the lessons, explaining what was learned, and recommending what to avoid.

After VMC product launch:

After a site has been delivered there is very little communication between partners and the multimedia company, other then tweaking, enhancements, or regular warranty work when the project terminates. The relationship with the partners tends to drop off and the multimedia company ceases to track their satisfaction, concerns, and successes with the product. How to track users and build a site that meets their interests and changing needs is critical to a project's lasting impact for partner museums and heritage organizations.

After the launch of VMC products, project managers should maintain the content, or ask the multimedia company that produced the site to maintain the site (i.e., updating content rather than re-developing the site). Fourth and fifth generation sites today are doing that, although the sites are not as engaging from a graphical or interactive perspective. 'Dynamic content management technologies' can ensure that users come back to a site.

VMC products should not be one-shot projects that lose relevance and users as they age. Older sites, especially ones that are well established in search engines, should be re-designed and updated. Rather than making many projects with smaller budgets, Virtual Exhibits and Games should be created that are a 'living breathing repository,' because they evolve, changing in content and interpretation over time. The changes give users a reason to revisit VMC products.

Measuring Quality of Existing Online Museum Products in the Virtual Museum Portal

The Virtual Museum of Canada Engagement Factor

CHIN has been collecting statistics on the Virtual Museum of Canada since the launch of the VMC site in March 2001. **The Engagement Factor** is a relatively new statistic used to communicate the VMC's performance as a whole, and to report on each of the VMC's products separately. The statistics used to calculate Engagement Factor are:

Figure 2: The Engagement Factor

Engagement Factor	=	# of visits / # of visitors	x	length of time a user spends on the site

The statistic is an interpretive element, which is looking at VMC statistics in a new way. Marketing campaigns, Features, and search lists (e.g., using Google) all impact on a VMC Virtual Exhibit's or Game's Engagement Factor. In the following analysis, statistics reported for VMC products were collected during the year 2002.

Engagement Factor Analysis

Methods of Analysis
Quantitative analysis
- statistical data from VMC server
Qualitative analysis
- interviews with Project Managers of VMC products
- analysis of Feedback messages received

Quantitative Analysis

Tracking Online Visitors

Tracking on-line experiences has become a rigorous process for gathering statistics on visitor use. When someone visits a page on a Web site, a request is made to the Web site's host computer to send electronic information about the visitor's computer. Those requests are tracked as 'hits'. Basically, a hit registers each time a visitor clicks on part of the site. A hit also registers for each graphic or link on a page. Therefore if a visitor merely looks at a page with four graphics on it, that visitor registers as four hits. These statistics are stored in a log file on the Web site server and may be viewed on screen or printed out. In addition to basic log file tracking, various data collection software is also available (such as *WebTrends*™, *Summary*™, *Webalizer*™) to produce more detailed reports, charts, and tables with visitor statistics.

Comparison of Statistical Data of VMC Products

(See Figure 3 for a comparison of the statistics collected in 2002)

Visits & Visitors

(See Figures 4 and 5: Visits and Visitors charts)

Virtual Exhibits with globally appealing topics have the highest number of Visits. Christmas Traditions, which peaks seasonally in November and December; ranks highest in Visits and Visitors (1st), and *Panoramas* about North American landscapes ranks next highest (2nd). *Butterflies North and South* about an exquisite non-threatening insect also has a high Visit ranking (3rd), as does *Haida Spirits of the Sea* about indigenous peoples (4th).

Visits / Page Views

(See Figure 6: Visits / Page views chart)

Visits / Page Views shows more consistency than number of Visits and Visitors to a Virtual Exhibit or Game across the Engagement Factor sample. The three highest Engagement Factor sites are evident – *Butterflies North and South* (highest in Page Views) and *Haida Spirits of the Sea* (second highest in Page Views).

Duration

(See Figure 7: Duration chart)

Of the three Engagement Factor statistics that can be obtained through log files, statistics show the most variability in Duration. Duration of time spent online seems more important to determine the quality of the Web site; the longer the user stays the more 'engaged' they are likely to be.

(*Haida* ranks 7th in Duration) compared with *Christmas Traditions* (ranked 19th for Duration, and particularly low at Christmas time when there are the most Visits and Visitors), and *Panoramas* (ranked 23rd in Duration). *Butterflies North and South* had more Visits / Visitors in March when it was Featured, and fewer in November.

Interestingly, users tend to spend more time on the following Virtual Exhibits in language versions other than English (particularly those in French, Spanish, and Portuguese). *Haida Spirits of the Sea*; *Explore Herschel Island!*; *Yukon Photographers*; *The Astonishing World of Musical Instruments*; *Christmas Traditions*; and *Panoramas* (yet less time in Perspectives). The language differences may be because of modem speeds, search engines used, and the amount of related online content in different languages. Users tend to spend equal amounts of time in the different language versions of the following sites: *Butterflies North and South*; *Staying in Tune*; and *Hockey*. The topics of these sites – butterflies, music, and a popular Canadian sport – may be easier to access across languages.

Figure 3: Statistical Data from VMC Server and Search Rankings collected during the year 2002.

Site	Engagement Factor* (Ranking)	Statistics* (Ranking)	Duration by language (average)	Highest Users by country	Search Phrases	Search Ranking in Google
Haida Spirits of the Sea	3rd	Visits=4th Visitors=7e Page Views=2nd Duration=7th	F=15:29 S=14:42 P=15:14 E=8:13	Canada U.S. Brazil France U.K. Netherland	Haida, haida art, totem pole/s, totem pole/s, haida indians	Page 1 : 'haida'
Butterflies North and South	9th	Visits=3rd Visitors=5th Page Views=1st Duration=15th	F=8:55 S=9:23 E=7:09	Canada France Mexico Spain Belgium	mariposa/s, papillon/s, butterflies, mariposas monarcas	Page 5 : 'butterflies' Page 1 : 'butterflies canada'
Yukon Photographers	10th	Visits=21st Visitors=26th Pages Views=27th Duration=9th	F=9:17 E=8:00	Canada U.S. France Belgium Switzerland	yukon gold rush, 1897 gold rush	Page 1 : 'yukon gold rush'
Explore Herschel Island!	12th	Visits=26th Visitors=27th Page Views=24th Durée= 7th	F=14:08 G=7:49 E=7:59	U.S. Canada Netherland France Australia	herschel island, corset, ancient discoveries, comb, ice heaving	Page 1 : 'herschel island'
Perspectives: Women Artists in North America	13th	Visits=30th Visitors=28th Page Views=11th Durée=5th	F=3:57 S=6:28 E=13:55	U.S. Canada Mexico France Spain	(la) modernidad, modernity, North modernité, North American women artists	Page 5 : 'North American du Nord American women artists'
Staying in Tune	14th	Visits=6th Visitors=6th Page Views=7th Duration=13th	F=7:45 E=7:51	U.S. France Canada Belgium Japan	instruments de musique, darbouka, arab music, mezoued	Page 5 : 'Instruments de musique'
Christmas Traditions in France and in Canada	17th	Visits=1st Visitors=1st Page Views=3rd Duration=19th	F=9:04 E=4:52	U.S. Canada France Spain Belgium	stockings, nativity, rois mages, Christmas stockings & songs	Page 1 : 'Christmas Traditions'
Panoramas: The North American Landscape in Art	20th	Visits=2nd Visitprs=2nd Page Views=5th Duration=23rd	F=11:18 S=7:56 E=4:43	U.S. Canada Mexico France Spain	landscape art, paysages, landscapes, North American landscapes	Page 1 : 'North American landscapes'
The Adventure Train / SafeTrax	25th	Visits : 23rd Visitors : 19th Page Views =18th Duration : 22nd	F=4:41 E=4:32	Canada U.S. France	Le train, train, in train, train safety	Not easily found in search engines.
Hockey: A Nation's Passion	34th	Visits=15th Visitors=13th Page Views=17th Duration=34th	F=5:05 E=4:10	Canada U.S. France	Montreal Forum, Spengler cup, Jose Theodore, hockey,hockey in Canada	Page 9 : 'Montreal Forum'
The Astonishing World of Musical Instruments	35th	Visits=28th Visitors=20th Page Views=22nd Duration=33rd	F=4:10 E=2:25	Canada U.S. France Japan	musical instrument/s, instruments musique monde	Not easily found in search engines.

Languages: E=English, F=French, S=Spanish, P=Portuguese, G=German

Note: The Engagement Factor ranking is not an actual 'score,' but a ranking of the scores. This is also the case for Statistics, therefore, the lower the ranking the higher the Engagement Factor.

Web Site Traffic

The following four charts show Web site traffic of twelve VMC products collected during the year 2002.

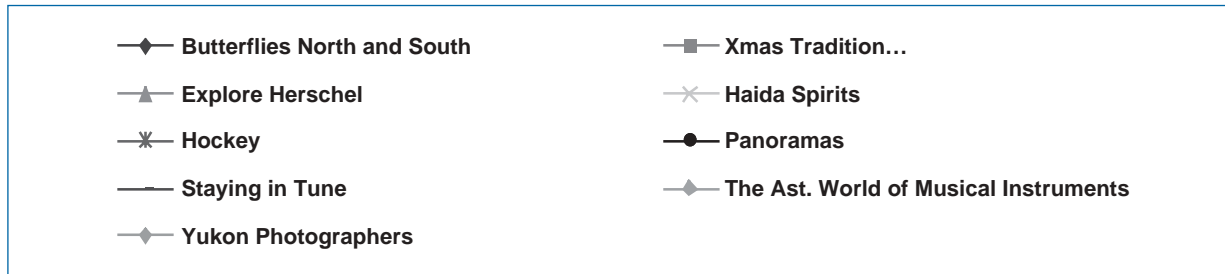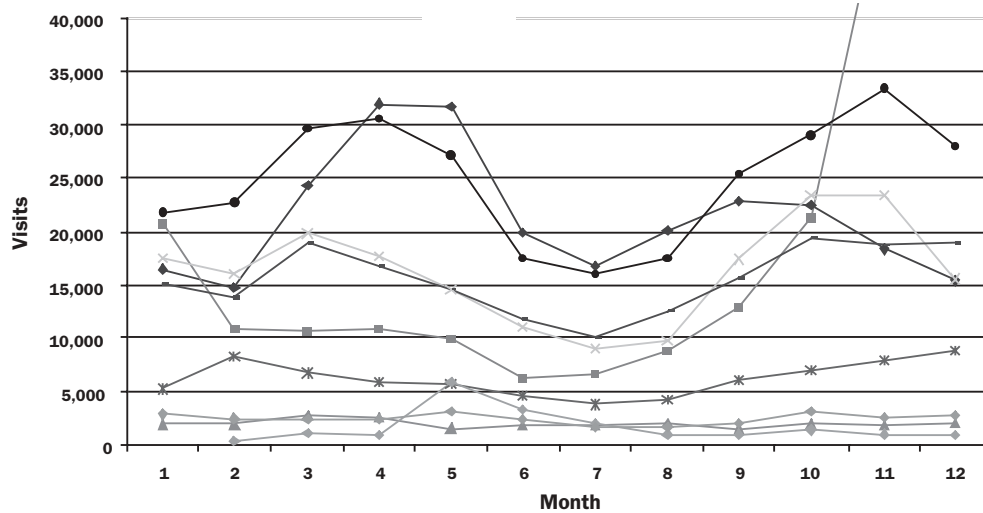|			
◆ Butterflies North and South		■ Xmas Tradition…	
▲ Explore Herschel		✳ Haida Spirits	
✳ Hockey		● Panoramas	
━ Staying in Tune		◆ The Ast. World of Musical Instruments	
◆ Yukon Photographers			

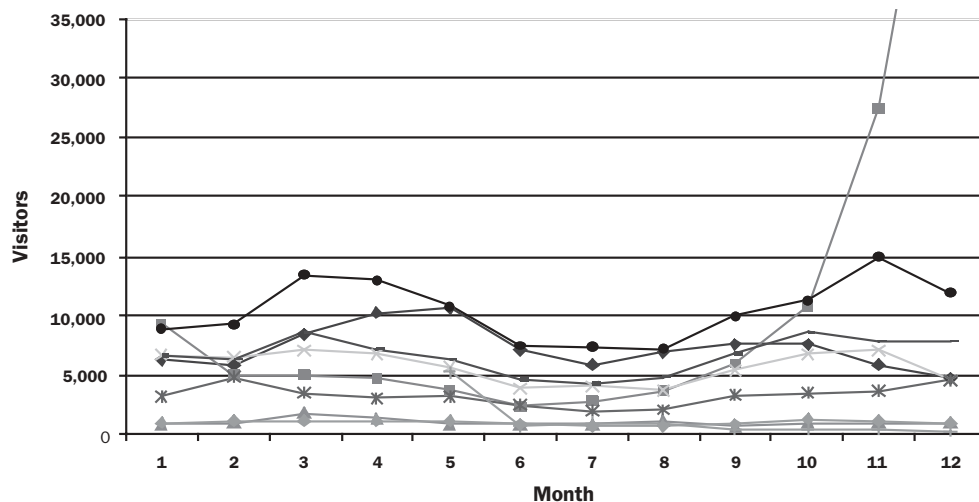### Figure 4: VISITS

Figure 5: VISITORS
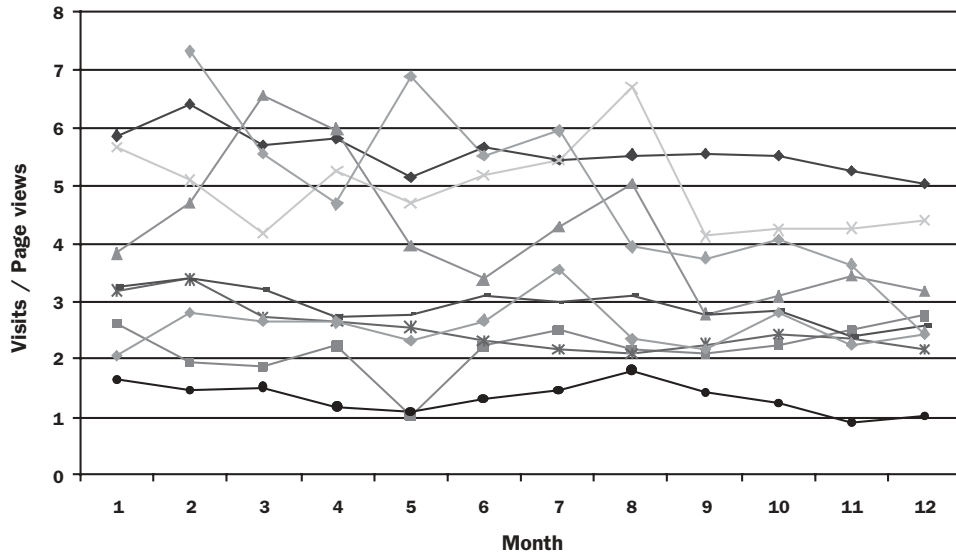
Figure 6: VISITS / PAGE VIEWS

Figure 7: DURATION
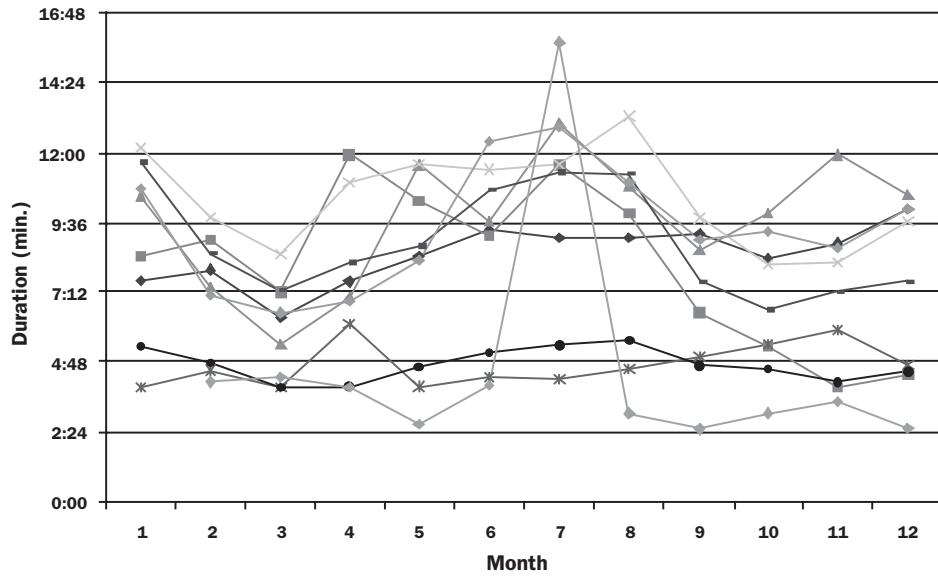
Understanding Engagement Factor

Haida Spirits of the Sea [EF 3ʳᵈ] / Butterflies North and South [EF 9ᵗʰ]

Haida Spirits of the Sea and *Butterflies North and South* are both deserving of their high Engagement Factor ranking. They contain key elements in design and contents that would seem museologically to provide for a more engaging online experience (e.g., compelling narratives, depth of information, good information strategies, and clear navigation and organization).

Butterflies North and South has considerable depth of information and meaningful content. Content for *Haida Spirits of the Sea* was given freely, from the heart and soul of the Haida. Although catering to different audiences, both launch dates and approaches are more educational than edutainment sites and continue to be very successful VMC products.

Yukon Photographers [EF 10ᵗʰ] / Explore Herschel Island! [EF 12ᵗʰ]

Both of these sites were created by the same collaborative group in the Yukon and launched on the VMC site in 2001. Both are content-driven and informative, but more like traditional exhibits than sites that take advantage of the potential of online experiences for users (the Web still seems to be driven by content rather than 'edutainment' or 'entertainment').

There are elements in the design of both Virtual Exhibits that decrease the potential for user engagement, such as linearity, limited possibilities for interactivity and self-directed exploration, little directed content in thematic sections, non-intuitive navigation, and a text-driven home page.

The two sites are similar in all Engagement Factor-related statistics. Since *Yukon Photographers* ranks slightly higher in Visits, it is ultimately slightly higher in Engagement Factor.

Staying in Tune [EF 14ᵗʰ] / Astonishing World of Musical Instrument [EF 35ᵗʰ]

Although music seems to be a popular topic for users of the VMC Web site, two Virtual Exhibits about musical instruments, *Staying in Tune* and *The Astonishing World of Musical Instruments (AWMI)*, have very different Engagement Factor rankings. *Staying in Tune* ranked 14ᵗʰ and *The Astonishing World* ranked 35ᵗʰ.

Possible reasons for discrepancies in EF

Astonishing World makes an attempt to explore how music is an essential element in the understanding of 'primeval myths' however there is no introduction to individual people or cultures. *AWMI* is aesthetically attractive and impressive in design, but the bulk of site content is created in images (GIF). Many pages contain one large image and not much text. This means that the images are saveable, but users

cannot cut and paste text from the web site itself. Heavy use of images as content affects the Engagement Factor Ranking because search engine robots cannot index content contained in an image. Designed in a traditional exhibit narrative linear format, *AWMI* doesn't allow for multiple entry and exit points (this would affect page ranking in Google). Perhaps most important, unlike *Staying in Tune*, users are not offered opportunities to listen to the sound of different instruments.

Christmas Traditions in France and in Canada [EF 17th] / Panoramas: The North American Landscape in Art [EF 20th] / Perspectives: Women Artists in North America [EF 13th]

Two very different Virtual Exhibits that rank in the mid-range in Engagement Factor are *Christmas Traditions in France and in Canada* and *Panoramas: The North American Landscape in Art*. Closely related to Panoramas is a third Virtual Exhibit, *Perspectives: Women Artists in North America*. A consortium of international partners developed all three sites. *Christmas Traditions in France and in Canada*, the first Virtual Exhibit designed by CHIN, was launched in December 1995 as a Canada-France Agreement experiment in museum Internet productions. It is a very popular seasonal Virtual Exhibit, spiking in usage in November and December each year. *Panoramas: The North American Landscape in Art* and *Perspectives: Women Artists in North America* were both quite recent collaborative projects among Canada, Mexico, and the United States.

Christmas Traditions in France and in Canada and *Panoramas: The North American Landscape in Art* are the most popular Virtual Exhibits in terms of number of Visits and Visitors, and two of the most highly ranked in terms Page Views. However, users spend little time on each site. As a result, their Engagement Factor ranks are only mid-range.

Possible reasons for discrepancies in EF

Christmas Traditions in France and in Canada ranked mid-range for Engagement Factor. High seasonal popularity offers little support to the relevance of Engagement Factor for measuring quality in online user experience. It is a Virtual Exhibit with a 1995 design site. The seasonal variation is critical for this site – it has the highest number of Hits and Visitors in December, but has one of the lowest overall rankings for Duration of Visits.

For different reasons, the Engagement Factor does not reflect the high quality design, visually rich images, and multiple forms of communication for users exploring both *Panoramas: The North American Landscape in Art* and *Perspectives: Women Artists in North America*. Perhaps in this case, users may require more comfort and expertise interpreting the artworks, which may potentially discourage users who visit the Virtual Exhibits to spend time on them.

The Adventure Train & Safe Trax [EF 25th] / Hockey: A Nation's Passion & Sign Me Up / Regulation Size Only [34th]

The *Adventure Train* is an interactive game about the Canadian railway launched in May 2002. *Safe Trax* was launched in January 2003 and has been marketed by Sympatico. The Web site is about helping a girl and boy stay out of danger as they venture near a rural crossing, a rail yard, and a railway bridge. Both sites require Macromedia's Flash player in order to play.

Hockey: A Nation's Passion has more Visits and Visitors than *The Adventure Train*. Users spend much more time playing *The Adventure Train* than they spend time on *Hockey: A Nation's Passion*. Since *Sign Me Up / Regulation Size Only*, an interactive game on the Hockey Site was launched and featured in late 2002, the Engagement Factor statistics for *Hockey: A Nation's Passion* have increased.

Generally, the Engagement Factor ranking for both VMC products has remained quite low even though they were featured several times. *The Adventure Train* was marketed as part of a Sympatico Campaign. Statistics spiked enormously during that period, but returned to the previous levels as soon as the contest was over. One reason for this might be that sites created with Flash are not easily indexable by search engine robots. Thus, once the campaign was over users didn't have a means to find the site again. 'Hockey' as a Canadian sport is featured throughout the VMC Web site's Landmarks. The statistics on the interactive game *Sign Me Up / Regulation Size Only*, a component of this Virtual Exhibit, may impact on the statistics for the site.

Museum-based activity and games should introduce youths to concepts or activities that are new to them. The sites should allow young people to engage in a series of actions, which will teach them something meaningful (e.g., about railroad safety). Online interactive games can also creatively educate and encourage discovery of a museum's collections.

Qualitative Analysis

In-Depth Site Analysis of Selected VMC Products

The Virtual Museum of Canada houses many Virtual Exhibits and interactive games. In consultation with project managers, a cross-section of five VMC Products from 1998 to 2002 was selected for the In-Depth Site Analysis. The assortment of exhibits features at least one of the following: a constructivist approach, strong cultural partnerships, a youth development model, identification of surrounding organisms, or ties to local tourism. A site summary of five selected VMC products comment upon:

- Quality of User Experience

- Potential for User Engagement

- Engagement Factor vs. Engagement Experience

- Factors that Contributed to Higher Quality in Online User Experiences

- Framework for Creation, Development, and Production

- Strategies for Engaging Online User

- Challenges

- Successes

- Use of Learning

- Feedback Messages

- User Testing

Interviews with Project Managers and Multimedia Developers

Interviews with project managers and multimedia developers provided a more in-depth understanding of how development teams planned for target users to experience VMC products for higher Engagement Factor rankings.

The Interview Process

Questions asked during semi-structured conversational interviews with project managers and multimedia developers included:

- Models or frameworks for creating, developing, and producing VMC products.

- Strategies for engaging online visitors.

- Challenges or obstacles in developing their product.

- Successes related to online user experiences.

- Use of learning about online user experiences by heritage organizations or museums.

- Knowledge or impressions of statistics and user Feedback messages related to the VMC product.

- When VMC products are successful in having quality in online experiences, what should be considered in the creation, development, and production process?

Interview Summary

The following is a summary of responses to the above questions across interviews. For each topic, there is a general overview of general themes that emerged, and a summary of specific responses for each VMC product.

Models or Frameworks for Creating, Developing, and Producing VMC Products

Several models or frameworks guided the creation, development, and production of the VMC products:

- A more traditional model of providing information to users in layers.

- A constructivist approach in which target users would build meaningful experiences for themselves.

- Development of a theme, project plan, calendar, and objectives.

- Using partners from museums and heritage organizations who could bring a wealth of input and content to the project, and often selected because they had already done research related to the topic or theme for the VMC product.

- Working with multimedia developers who thought about how to best access users in the design of the site, and create new and novel experiences for users through the site architecture and structure for content.

Strategies for Engaging Online Users

Across the VMC products in the interview sample, the following were some similarities in strategies used for engaging online users:

- Using different languages and levels of technological access for a wide range of users.

- Identifying target user groups, the types of images and content they would be interested in accessing, and understanding that the staying times for different users are based on different motivations for using the site.

- Creating a simple, crisp, clean design with rich images and content to engage users.

- Enticing publics with the sheer volume of objects from a variety of international museums and heritage organizations on one site.

- Making sure that experiences for both novice and 'power' lifelong users are provided. Ensuring that fun is part of the educational content and learning experience. Using a less linear navigation appealed to a target youth audience.

- Providing opportunities, often through themes, for users to build or construct unique, personally meaningful experiences.

Challenges or Obstacles in Creating, Developing, and Producing VMC Products

Project managers and multimedia developers talked about several challenges or obstacles in the creation, development, and production of VMC products. The predominant challenges included:

- Communication infrastructure, particularly using teleconferencing for consesus-building with international partners about content, learning objectives, and design of sites.

- Incorporating the newest technologies, with different Canadian compared to international accessibility standards.

- Restrictions related to developing the VMC product on a server within the multimedia company and migrating it to an external server.

- The time it takes to create, develop, and produce a quality site within a limited timeframe and a VMC launch deadline.

- Receiving additional content during the development stage of the project and the associated additional costs and work related to translation and inclusion of these materials.

- Writing for the Web, which is so different than writing for an on-site, physical exhibition.

- Motivating and encouraging students to be involved in the development process, and mentoring and supervising Interns who worked on projects.

- Building a site that includes Flash, QuickTime, and audio requirements.

- Different perceptions about project management by project managers and multimedia developers.

Successes Related to Online User Experiences

There were also important successes across the VMC products, which have impacted on the quality of user experience on each site. Project managers and multimedia developers described successes as:

- A development process that is sensitive to the needs of its users and works from the users' perspective.

- Promotion of good relationships with multimedia companies who work with leading edge technologies.

- Good working relationships with high quality museum and heritage organization partners, nationally and internationally.

- Opportunities for Interns to gain experience and assist on projects, and for students to be involved in the development process of sites.

- Excellent quality of content and images in Gallery sections of Virtual Exhibits.

- Different language versions, which enable more diverse users globally to have access to VMC products.

- Marketing of regions across Canada, and the promotion of tourism to these areas.

- Building technical capacity across Canadian museums and heritage organizations.

- High access and traffic to these VMC products and the VMC generally, in part because of press at launches, Marketing, and Featuring.

Use of Learning about Online User Experiences by Heritage Organizations or Museums

In most cases, project managers and multimedia developers did not know if involvement in the creation, development, and production of a VMC product impacted on practice within physical museums. In the past there has been little follow-up to see whether partners used the material for other purposes. After the multimedia developers have delivered a product, other than tweaks and small modifications, enhancements, or regular warranty work, the production team moves on to other projects and there has been little communication with the partners. One suggestion was that through a post launch survey all project partners could be invited to reflect on:

- Are partners getting the return that they need or is the product just another task or way to digitize collections?

- Are partners getting the most they can out of a VMC project, in terms of the promise of original, multi-institutional projects with different content and broadened views?

Feedback Messages

Feedback messages are received from Virtual Exhibits and Games that are hosted on the VMC portal, and on VMC Investment Program sites that are hosted on other servers. Feedback messages tend to have positive messages (e.g., "nice site" with a brief one line comment). Some users are looking for information or needing help. Students sometime request help with their homework.

An analysis of Feedback messages for the Virtual Exhibits in the *Quality in Online Experiences* interview sample provided information about what particularly interested individual users in response to specific VMC products during 2002.[1] Motivation for visiting a Virtual Exhibit and interests in exploring the site tend to be very specific and unique to each site.[2]

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1 Kati Geber from CHIN analyzed 1,004 messages to the VMC portal from April 2001 to May 2002 and evolved an initial set of categories for VMC Feedback messages. The following categories seemed to be representative of Feedback messages received across VMC products: Opportunity to Actively Dialogue; Information Requests; Self-Promotion; Positive Feedback or Experiences; Corrections or Suggestions; Research and Educational Requests; Nostalgia, Personal Meaning, and Stories; Donations and Contributions; Challenges such as Technical problems; Missing Content; Language or Cultural Issues.

2 Since its launch in January 2002, the Costume Museum of Canada Virtual Tour, *Milestones and Memories* has received the most amount of Feedback and positive Feedback (e.g., how lovely the site is), and is one of the only sites with references to wanting to visit the museum (e.g., "I'll have to make sure I get to the museum"). Perhaps users connect the Museum with what they have experienced online because the Museum is actually being presented in the Virtual Exhibit.

In-Depth Site Analysis for a Sample of Five VMC Products

Haida Spirits of the Sea

Figure 8: Haida

Subject:
Invites discovery of the Queen Charlotte Islands and the Haida Gwaii people's profound relationship with the sea.

Producer, Creators, Funders:
Old Masset Village Council (OMVC) and a consortium of organizations (the Haida Gwaii Museum at Qay'llnagaay, Museum of Anthropology at UBC, Royal British Columbia Museum, and Department of Indian Affairs and Northern Development).

Quality of User Experience	Potential for User Engagement	Engagement Factor vs. Engagement Experience
At time of creation, the technical use was avant-garde and innovative. Stories and images welcome user into cultural events such as traditional weddings and potlatches Offers optional animation with Flash and Realplayer.	Design approach resonates with the Haida style. Site is inclusive and representative of native voice. Site navigation is simple and content is compelling. A fair bit of information available here on Totem Poles, Canoes, Haida art.	Older site means that it is more well-known. Use of first person narration provides cultural access and intimacy. Reliable online resource about the Haida people. Rich media content – watching videos and listening to audio takes time.

Factors that Contributed to Higher Quality in Online User Experiences

- This Virtual Exhibit has been successful in sharing unique content and raising consciousness about the Haida as a living culture. Because the two Curators responsible for the content development of *Haida Spirits of the Sea* represented the Haida community, they were able to provide a fresh, unique and inclusive approach to the creation and development of the site. Its first person narrative approach helps to make the content representative of native voice. The design approach resonates with the Haida style, as does navigation, which is in the form of a wheel, circle of life, or life cycle.

- The technology used to produce the site was 'cutting edge' in 1997 (with Java and horizontal scripting).

- Summative evaluation observing visitors interact with the site at the Expo '98 kiosk in Portugal indicated that the Virtual Exhibit had successfully hit its targeted market.

- Searching for 'Haida' in a Google search string puts the site on page one, as does 'totem pole!' Users spend an average of 15 minutes on the French, Spanish, and Portuguese versions of this site and 8 minutes on the English version. Haida is also included in the site's interactive game. A 'canned search' or pre-created and selected collection related to Haida increases links to the site.

- Feedback messages indicate how impressed users are with the site, and that some users plan to add the site to a links page.

Framework for Creation, Development, and Production

Launched in 1998, *Haida Spirits of the Sea* was a 'labour of love' for all contributors to the project. The two curators responsible for content development were from the Haida community, while Ananas Productions managed the multimedia production. The team used a traditional museum model of developing materials for multiple audiences with 'an onion skin approach,' providing information in layers to give people access to as much or as little as they choose to take away.

Challenges

Since online exhibits were very new in 1997, the development team for *Haida Spirits of the Sea* had few models upon which to base the development process. The entire project was developed via teleconferences and there was an unforgiving deadline – the kiosk presentation of the Virtual Exhibit had to be ready and burnt on disk for launch at Expo's Canada Pavilion in Portugal in early May 1998.

Use of Learning

A number of copies of *Haida Spirits of the Sea* were burned on CD for limited distribution, which are used in the schools in the Haida communities. The interactive game on the Virtual Exhibit, ***The First Totem Pole***, is in the Haida language, as well as the 4 other languages of the site. The Museum of Anthropology developed

The 'Respect to Bill Reid' Pole for the VMC Investment Program using some of their experience from working on this project.

Strategies for Engaging Online User

There are 12 versions of *Haida Spirits of the Sea* – versions in 4 languages (English, French, Spanish, and Portuguese) and 3 levels of technological access. The technological versions include:

a) A kiosk version where the user interacts only with the online buttons

b) A Java version, which was brand new in 1997 and very controversial

c) A non-Java version.

The kiosk was one of six multimedia displays at Expo '98 in Portugal. The Virtual Exhibit's content was diplomatic in approach (e.g., issues related to fishing as a very major aspect of Haida life).

Successes

The development team for *Haida Spirits of the Sea* was extremely sensitive to the needs of the community. The open door policy from the Royal British Columbia Museum and the Museum of Anthropology enabled curators to choose what they wanted and feel supported. The technology was leading edge at the time. For example, a special server was made available for sound, which had not been used on previous products. Horizontal scripting in the canoe section enables users to paddle their way through the interpretive text (vs. top to bottom scrolling)

User Testing

A Grade 6 class of gifted students in Ottawa gave feedback on what they liked about the Virtual Exhibit. The project manager did some basic observational summative evaluation at the kiosk in Portugal during the last month in Portugal (e.g., what people were looking at; gender / age trends) and found that the development team had 'hit the market,' which was very rewarding to learn.

Feedback Messages

Patterns in overall messages during 2002:

- Very impressed, so much to see, wonderful information.
- Request for more info about Haida art.
- Support for political and environmental issues.
- Plans to add the site to a links page (e.g., a northwest coast artist).

Butterflies North and South

Figure 9: Butterflies

Subject:
Allows users to identify butterflies and moths. Teaches how to watch, attract butterflies and protect butterfly habitat and offers links to find out more.

Producer, Creators, Funders:
A consortium of museums (Canadian Museum of Nature; Insectarium de Montréal; Museo La Salle in Peru; Provincial Museum of Alberta; Nova Scotia Museum of Natural History), Canada-Peru partnership.

Quality of User Experience	Potential for User Engagement	Engagement Factor vs. Engagement Experience
Lots of content, which is directed and useful for identification of butterflies.	Design of this site is very good by 1999 standards.	Great depth of information, logically presented will keep people on site longer.
Appeals to both teachers and students; this site can be as a teaching aid to complement these activities.	Clear navigation and organizational structure.	Subject matter has a broad appeal beyond the museological experience (i.e., to gardeners, hobbyists, conservation / wildlife enthusiasts, Butterfly Conservatories internationally, etc.).
Uses QuickTime.	Site appeals to a broader audience but still delivers specific and detailed information.	
	Large number of species presented.	

Factors that Contributed to Higher Quality in Online User Experiences

- *Butterflies North and South* is an exhibit that helps users easily and quickly identify butterflies and moths through images in the Galleries on the site. There is specific and detailed information about the large number of species presented.

- A user-focused development included interviewing visitors at one of the partner's physical museums; this was important for identifying user interests about butterflies. As a result of user testing, the need for a partner was identified to supply colourful images of butterfly photographs (i.e., Museo La Salle in Peru).

- Information-based games have been highly featured, allowing the opportunity for user interaction, and educational content.

- Featuring including a Butterfly Discover Page and a 'canned search' related to butterflies has increased the number of links to the site. The research team found 117 unique references to the site from a wide range of international institutions.

- Feedback messages indicate that users are impressed with the beauty of the site, find it appealing visually, and plan to add it to a favourites list or a starting page on butterflies.

Framework for Creation, Development, and Production

The *Butterflies* project was heavily partner-driven. Each partner contributed to every section, thus effectively focusing development on the content. Launched in 1998, it was managed by Ananas Productions. Created and produced by a consortium of museums, an effort was made to make use of the strength of each partner.

Challenges

Every partner working on *Butterflies North and South* wanted to provide content (to the extent that each had enough material for an entire Virtual Exhibit on its own). Because extra content was added during the development, there were unanticipated translation costs for the 3 language versions for the site. An additional challenge was having Interns working at different institutions (i.e., the Provincial Museum of Alberta, Insectarium de Montréal, Nova Scotia Museum of Natural History, and the multimedia company in Montreal), and sending them to Peru.

Use of Learning

The launch for *Butterflies North and South* was at the Insectarium de Montréal at the same time as the opening of a butterfly aviary. There may have been a computer section set up in one of the exhibit's rooms.

Feedback Messages

Patterns in overall messages during 2002:
(highest number of messages in the sample)

- Very appealing visually, and excellently displayed information and images.

- Requests for online photos and printable version of butterflies.

Strategies for Engaging Online User

This site was designed in a manner that users can quickly and easily identify butterflies and moths outdoors, get the information they need, and then leave the site. Developed in 3 languages, images were made at a size to be easily identifiable, and organized by Habitat, Families, and Colour. The two strongest sections were the Gallery and the Teachers' Centre.

Successes

The development team actively worked from the users' perspective, trying to be specific about what the user might try to do on the site, why they were coming, and what information they might want. The Gallery sections help users to identify butterflies they find in the outdoors very clearly and effectively. Everyone worked very well in the partnerships and great Interns worked on the project. A fair amount of traffic comes from the Spanish version, which was added because of the Peruvian partner in the project.

User Testing

The Provincial Museum of Alberta had conducted audience testing related to butterflies prior to developing the site. The research indicated that visitors wanted to see local species of insects from their backyard. Not realizing that they would not see more exotic looking, brightly coloured butterflies in their backyard, users commented that seeing a bunch of brown insects was boring. As a result, a new partner (Museo La Salle in Peru) was brought on the project to add more stimulating butterflies to the Web site.

Yukon Photographers

Figure 10: Yukon

Subject:
The site features historical photographs taken just before, during, and after the gold rush. Describes the types of cameras that commercial photographers and amateurs used during that time, how negatives were printed, and popular forms of photographs.

Producer, Creators, Funders:
Yukon Heritage Branch with a grant from the Northern Research Institute, Yukon College, and funding from the Canada-Yukon Bilateral Agreement.

Quality of User Experience	Potential for User Engagement	Engagement Factor vs. Engagement Experience
A content-driven, informative site. Image collages surround each photographer's portrait. The home page is text driven (i.e., 225 words of text in introduction).	Navigation could be more intuitive. Users must scroll to bottom to view navigation links on all pages except home page. Integration of communication devices would be beneficial as pages are either dominated by text or feature images with little explanation.	The longest visits are in the summer, contrasted to most other VMC Virtual Exhibits. Although more users visit the site during the school year, they tend to stay longer in the summer.

Factors that Contributed to Higher Quality in Online User Experiences

- Yukon youth and local expertise enabled the local community to build the capacity for Web development, allowing them to build flexibility in their design. This made it possible to make revisions easily.

- The Museums Advisor at the Government of Yukon Heritage Branch and his team have learned from their Virtual Exhibit, user statistics, and Feedback messages how to create, develop, and produce more engaging and interactive Web sites.

- Emotionally powerful stories invite users to think about content and images on the site, which are open to different interpretations, ongoing debates, and information sharing.

- The Yukon site appeals to 'niche' markets and listservs help to promote and market the Virtual Exhibits. Feedback messages indicate that this site (along with *Explore Hershel Island!*) help users connect to their own personal stories, memories, and associations related to living in or visiting the Yukon.

- Some users have suggested corrections about information and identification of online photographs. Others have reported problems with navigation, font size, and suggestions to improve the site's quiz.

Framework for Creation, Development, and Production

In 2001, CHIN commissioned Virtual Exhibits where there were already great ideas with themes related to humanities, history, ethnology, and natural sciences. It was possible to develop *Yukon Photographers* at a low developmental cost, thanks to existing research on photographers of the Gold Rush. The project manager helped with VMC technical specifications, meeting deadlines, designing logos, answering questions, and helping with translations of bilingual or trilingual products.

Strategies for Engaging Online User

The development team for *Yukon Photographers* felt that a combination of rich content and images are engaging and different than users' experiences reading a book or visiting a museum. Users read through, do research, look at the images in their area of interest, and some print out material. From an educational standpoint, schools and students both inside and outside of the Yukon are using the site. The site is developed in 2 language versions (English and French).

Successes

An important success for the Yukon group is that none of the money for this, or the Heritage Branch's other Virtual Exhibits, such as *Explore Herschel Island!*, was used to contract people outside of the Yukon; rather teams were brought together with people who live in the Yukon. As a result, the larger population sees that these products have been developing in the Yukon and that there are teams in the Yukon that can produce Virtual Exhibits that 'stand along side' other VMC products.

From a tourism standpoint, the Government of Yukon Heritage Branch had been focusing on German tourists, and thought the French in Canada and in Europe were not that interested in the Yukon. Responses to the Web site by French users indicate that their assumptions were incorrect.

There are unique stories and tales, which cover a long time range and are cross-cultural. The site is not technologically flashy but its strength and simplicity allows the stunning images to speak for themselves. Yukon Photographers has extremely old film footage from the early part of the century, which was digitized using QuickTime and incorporated into a special section, offering different experiences to a range of audiences.

Use of Learning

The team approach within the Yukon group has enabled them to do more experimenting and be more willing to take a risk. They have built curriculum units that fit the British Columbia / Yukon curriculum and the Western Canadian protocol, which are being promoted to teachers by a Resource person with Yukon's Department of Education.

Feedback Messages

Patterns in overall messages during 2002:

(3rd highest number of messages in the sample)

- Very positive messages, particularly about the photographs.

- Users' own very personal stories, memories, and associations.

- Request for a copy of online footage.

- Corrections about information and identification of photographs.

- Problems with navigation and font size.

Perspectives: Women Artists in North America

Figure 11: Perspectives

Subject:
Celebrates the important contributions of women in the arts from Canada, Mexico, and the United States from historical, modern, and contemporary art perspectives across cultures and periods.

Producer, Creators, Funders:
The Instituto Nacional de Bellas Artes, Consejo Nacional para la Cultura y las Artes, and the Secretaría de Relaciones Exteriores, as well as the Glenbow Museum, McMichael Canadian Art Collection, Musée d'art de Joliette, and Louisiana State Museum.

Quality of User Experience	Potential for User Engagement	Engagement Factor vs. Engagement Experience
Has a Helpful Hints and Information section about multimedia, music, poetry, and navigation. Requires downloading of QuickTime.	A design that is clean and intuitive with many excellent artifact images, which are available to view at multiple sizes. Thematic introductions to visual artwork with many examples, which reinforce or illustrate the thesis of each theme. Introductions to all themes, which on their own may be less clear to those unaccustomed to the study of Visual Arts.	Visitors may stay longer because there is multimedia to use and download and because there are individual pages where artwork is take longer to load. The target audience seems to be mature and educated, with themes like "Beyond Modernity: The Vulnerable Self."

Factors that Impacted Quality in Online User Experiences

- The design and approach seems to encourage user engagement. Multiple forms of communication are offered.

- Very well designed and visually rich, the site's object-driven presentations offer many levels of interpretation. The rich images and content have helped to give this site one of the highest Duration rankings.

- Contents are directed towards a more limited audience (i.e., users who have experience with sophisticated discussions of artistic interpretation), which may explain fairly modest Engagement Factor rankings.

Framework for Creation, Development, and Production

The multimedia developer offered options, provided technical expertise, and listened to what Curators brought forward, what types of works they wanted to present, and levels of interactivity for users, then presented a model to them in which creative works rather than technology could lead content. In initial discussion of target audiences, partners were interested in levels of interactivity. Since text needed to be translated into three languages, a database model seemed most suitable (i.e., images and text could be stored only once).

Challenges

Given a very limited time frame, it was difficult for the project manager to reach a consensus among partners who spoke different languages. When Curators wrote content, they often requested many changes, adding more development time, and cost for translation. Hosting the site on a remote server proved challenging for the multimedia company, who not only had to work with different Canadian and American accessibility rules, but also faced technological problems on a remote server that they had no control over.

Use of Learning

The Canadian Ambassador launched *Perspectives: Women Artists in North America* during the annual Cervantino Festival in Mexico. Strong links were created between the Ministry of Culture team that worked with the project manager, and the Cervantino Festival organizers. The Musée d'art de Joliette created an on-site exhibit with their own works and the project manager created and distributed pamphlets. McMichael Canadian Art Collection created an on-site exhibit of paintings related to the Virtual Exhibit, *Perspectives: Canadian Women Artists* (November-February, 2003).

Strategies for Engaging Online User

The multimedia developer tried to offer content in a variety of ways, used search filters by theme, and developed 3 language versions (English, French, and Spanish). There were different perspectives on the same works and different ways of 'drilling in' or offering users multiple entry points. Users do not have to click to see the name of the artist or artwork, and they are always given some data (like a headline in a newspaper) to enjoy the images with a short bit of information, or they can click on the artwork if they want more detail.

Successes

The site is popular with publics and achieves hoped for traffic numbers. The relationship among the institutions that developed it is very strong, particularly between the Canadian museums involved (Glenbow Museum, McMichael Canadian Art Collection, and Musée d'art de Joliette) and the Mexican institutions. Integrating Interns into the project was a wonderful idea and opportunity for the Interns. All of the Curators were pleased with the product, and proud of what was produced. Different countries had internal support for promoting and celebrating the product.
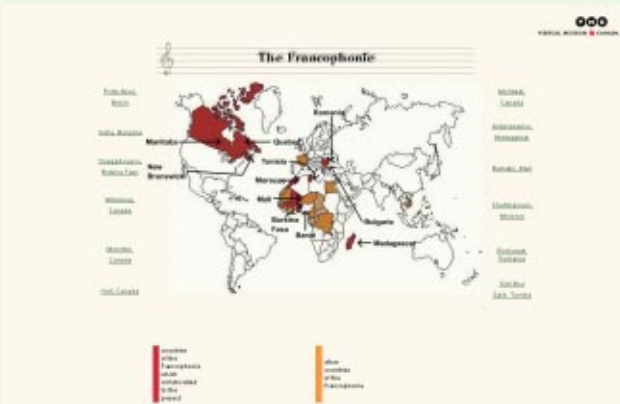
Feedback Messages

Patterns in overall messages during 2002:

Users reported problems with QuickTime, and some frustration using the site (e.g., wanting to improve the speed of moving images at the right of the screen). The multimedia developer explained that there are different possibilities for QuickTime (e.g., Real Audio, MS Audio Player), which could render files for a variety of plug-ins.

Staying in Tune

Figure 12: Staying in Tune

Subject:
Discover traditional francophone musical instruments and what connects them to the people who invented the instruments.

Producer, Creators, Funders:
Produced in coordination with Centre des recherches et études andalouses; Centre des musiques arabes et méditerranéennes Ennejma Ezzahra; Musée de la musique; Laboratoire de recherche des musiques du monde; Musée acadien de l'Université de Moncton; Canadian Museum of Civilization; Musée d'art et d'archéologie de l'Université d'Antananarivo; Musée ethnographique Alexandre Sènou Adande; Musée national du Mali; St. Boniface Museum; Lycée de langues étrangères Alexandre Dumas; Museum of the Romanian Peasant.

Quality of User Experience	Potential for User Engagement	Engagement Factor vs. Engagement Experience
Personal memories, stories, and sound qualities for many different instruments. Has Notebook, History, Activities, Glossary, and Museum sections. Features a recording of the sounds made by each instrument. Uses Shockwave. Navigation sometimes inconsistent.	More of a reference site than a traditional exhibit. Excellent metadata! Uses content description, RDF, Dublin Core and GEM metadata in two different languages (Boily, 2000). Presentation is aesthetically pleasing text-driven, rather than object-driven.	Truly global contents bring together a world of museums in one online location. Provides sounds produced by instruments presented. Lack of design consistency makes it more challenging for users to browse effectively.

Factors that Affect Quality in Online User Experiences

- Young 'Curators' in *Staying in Tune* researched an instrument, wrote about related stories and memories, and recorded sound for their instrument. Interns at the college and university level worked on the design and content for the site. Exchange opportunities enabled young people to visit places like Tunisia, write text with a peer, and attend the launch of the site.

- More fragmented text with more content on a page would have improved the design of the *Staying in Tune* site. A larger budget for research would have provided more resources to develop the content and design, or to work with a multimedia company who could have found new ways of developing the architecture and make the Virtual Exhibit more attractive and lively.

- *Staying in Tune* offers a wide selection of sound clips, allowing users to hear the actual music if they have the Shockwave plug-in. Students request help with music projects, and manufacturers and exporting companies try to promote their musical instruments. Individuals want to know the value of their own instruments, where to shop for instruments, and how to record from the site.

Framework for Creation, Development, and Production

Launched in 1999, *Staying in Tune* involved 11 museums in 9 francophone countries in Canada, Eastern Europe, and Africa. The development team worked on the Virtual Exhibit through conference calls and discussion. The multimedia developer from Musée Média developed the site architecture and structure, and supervised the multimedia work. Partners used a constructivist process in order that this Web site would be the expression of youth. Several 15-20 year-olds were selected to work on the project as invited 'Curators.' Each chose an instrument and wrote a poetic or personal text, sharing an experience, memory, or emotion related to the musical instrument. College and university graduates were hired through internships from Young Canada Works Experience grants for site design and programming or to work on content along with the curators and educators, and some were able to travel to partner museums.

Challenges

Challenges with communication complicated planning and developing (e.g., getting in touch with people through phone lines, faxes, and email). Four Canadian partners, six African countries (Mali, Burkina Faso, Madagascar, Benin, Tunisia, and Morocco), and two Eastern European countries (Romania and Bulgaria) were involved in the development process. African museums did not have the capacity to digitize their own material. The project manager provided support for shipping boxes of images, photographs, and slides to Musée Média to be digitized. Finally, young 'Curators' needed to be motivated and encouraged.

Use of Learning

After participating in the *Staying in Tune* development process, the Canadian Museum of Civilization developed their own exhibition on musical instruments of the world in 2000 *(Resonance: Musical Heritage of La Francophonie, 2001-2003)* and asked the project manager if they could use the Virtual Exhibition in a kiosk as a reference or tool for visitors.

Strategies for Engaging Online User

The development team wanted Staying in Tune to remain as educational as possible by using themes (e.g., Aerophones, Chordophones, Idiophones, and Membranophones), and engaging online users as much as possible. The target user was youth 15 to 20, and youth 15 to 20 developed the site in collaboration with Curators and Educators at partner institutions. The development team provided educational activities for users (i.e., a quiz, crossword puzzle, multiple-choice game, scrambled letters game, and making a musical instrument) and Musical Composition activities. The multimedia developer was experimenting with new ways of developing projects with students for CD ROMs she was developing and at the time, in 1998-99, a constructivist approach was not often used.

Successes

The students involved in the development process contributed to the success of the Virtual Exhibit. Five students selected by the World Music Research Laboratory of the Université de Montréal were involved in an exchange with Tunisia through the Agence Francophonie (intended to put young francophones in touch in francophone countries). Although the process of recording each instrument was challenging, everybody on the team thought it was a great idea to have some sound on the site and it was the element that made a difference in motivating the students to 'jump into' the project.

Feedback Messages

Patterns in overall messages during 2002:

- Manufacture and exporting companies with prices on their most popular items (e.g., conga harps, bongo, and digim).

- Individuals wanting to know the value of their own instruments, shopping for an instrument, or wanting to be able to record from the site.

- Students wanting help with music projects.

Evaluating 'Quality' in Online Museum Web Experiences

How relevant is The Engagement Factor (EF) statistic for measuring quality of online experiences for museum users?

What value does the Engagement Factor have as a measure of success for VMC products, or is there a better alternative?

Factors to take into account in using Engagement Factor as a success indicator:

Caching:

Large ISPs (e.g., AOL, Sympatico) cache a lot of content, meaning their users do not have to go directly to the VMC Web site.

IP addresses:

New IP numbers are given to users each time they visit a Web site, therefore repeat Visitors are difficult to track.

Visit and Visitor issues:

Hits: Search engine crawlers, spiders, and robots distort results by registering as 'hits.' A hit is registered both for the HTML page itself as well as for each image the page contains (i.e. one HTML page with five images will register as six hits).

Page Views: To factor out the problem with pages that contain separate images, Page Views are determined but are also distorted by the spiders, crawlers, and robots.

Visits or User Sessions are generated by requests from distinct IP addresses. The number of Visits or User Sessions may include both repeat and first-time users.

Duration of visit:

The Duration statistic is highly variable. The Duration of visit gives neither a sense of the range of times, nor whether users are looking at the site for the whole duration. Duration in reality records how long a user is logged on more than the amount of time someone spends using the site. Modem speed might also affect this statistic.

Other comparisons and questions that could be explored:

- Is there a measurable inverse relationship between Visitors and length of Visit, and between spring / fall and summer?

- Is there a correlation between publicity levels (unique referrals from other sites) to Visits?

- Is there an expectation that there be a low Visit / Visitor level and longer Duration level for a higher Engagement Factor?

- How can more repeat Visits by discreet users be measured?

Limitations of using Log files as a measurement tool:

Because of the way the Web operates, in particular the process of caching, logs do not reliably count the total number of page requests or user sessions (Peacock, 2002 p. 5). Log files consistently underreport repeat visitors and users from the most popular ISPs (because of caching). Log files may inflate the number of unique visitors to a site, as the same user may be logged with multiple IP addresses during a single session, suggesting that the sample users recorded in the logs are more likely to be first time visitors to the site. (*http://www.archimuse.com/mw2002/abstracts/prg_165000775.html*)

How online traffic can be a measure of success:

Log files are helpful in determining which paths users follow when navigating through Web sites and which content, pages and sections of the site are most interesting and engaging to visitors. For example, the **Ontario Science Centre** (OSC) Web development team tracks usage within their Web site, seeing where users are going online, and looking at what they are accessing (Soren & Lemelin, 2004). On-line traffic can be a measure of success particularly if Web developers can draw links between that traffic and visits to their physical institution (e.g., users accessing the OSC on-line calendar may be using the calendar to help plan their visit).

Advantages of using Log files for statistical analysis:

Despite having its limitations in determining unique and repeat visitors, log files produce quantitative data that can be subjected to statistical analysis. The data produced are a record of actual user behaviour rather than reported or assumed activity. Log data are recorded free of observer or questioner bias, and the data samples are large and can be tracked over time.

Visitors know what they are looking for:

A report entitled *Tracking the Virtual Visitor* (Johnson, 2000) noted that **The National Gallery of Art** in Washington has refined, and in some cases dramatically reshaped, the architecture of their Web site's interface to accomplish the following three goals:

1. The Web-going public should be able to easily locate the NGA Web site and its on-line resources.
2. Once they have arrived, Web visitors should be able to quickly find what they are looking for.
3. When visitors leave the site, they should want to come back again.

A quick look at the Web log statistics on the search words and phrases used to query the NGA site demonstrated that many visitors have a clear idea about what they are looking for. The vast majority used very specific words and phrases, usually artist names and titles of works of art, rather than general terms to define their search for visual arts-related online materials.

Other Approaches to Evaluating User Experiences

It is important that Web development teams involve their target online users in developing personally meaningful quality online experiences in which individuals can construct meanings in multiple ways. Performing user and usability testing, and providing opportunities for visitors to experience exhibitions both on-site and online seem most likely to promote high quality, engaging experiences (e.g., Harms & Schweibenz, 2000, *http://www.archimuse.com/mw2001/papers/schweibenz/schweibenz.html*). Furthermore these approaches will demonstrate a Web site's 'exchange' function of establishing and creating a network or a forum among users, or between museum experts and users.[3]

Wertsch (2002) contends that one major problem that continues to be challenging for museum professionals is evaluation of a museum's impact on its visitors. Although Wertsch is discussing visits to physical museums, his comments seem equally as relevant for evaluating quality in online experiences on a museum's Web site:

> One encounters many complexities when considering this issue, but none is more unsettling than a basic quandary that underlies the whole project. On the one hand, we are called upon to assess the impact that museums have on visitors. Increasing claims that museums play an important educational role have served to up the ante on this issue dramatically. On the other hand, precisely what it is that we should be evaluating remains unclear. Should visitors be acquiring new information? Should they be developing new areas of curiosity? Should visitors be engaging in some sort of identity project? Or is there something else they should take away from a museum visit? (p. 113)

Usability Index

One approach to analyzing how users feel about a Web experience is a Usability Index, which is a "measure, expressed as a per cent, of how closely the features of a Web site match generally accepted usability guidelines" (Keevil, 1998, p. 271). The Usability Index consists of five categories:

- Finding the information: Can you find the information you want?

- Understanding the information: After you find the information, can you understand it?

- Supporting user tasks: Does the information help you perform a task?

- Evaluating the technical accuracy: Is the technical information complete?

- Presenting the information: Does the information look like a quality product?

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3 For an example of front-end, formative, and summative user testing during the development of an award-winning VMC Virtual Exhibit, *Cloth and Clay: Communicating Culture*, see: Shaughnessy, Dalrymple, & Soren (2004) *http://www.archimuse.com/mw2004/abstracts/prg_250000759.html*; Soren (2004a) *http://www.informalscience.org/download/case_studies/report_68.pdf*.

The big advantage of the Usability Index (or 'heuristics') for Web communication is that by contrasting these established usability principles with the Web site under evaluation, the evaluator or information designer can decide if usability problems exist, what kind they are, and how they can be removed. The disadvantage of the heuristics is that they are very detailed and complicated.
(*http://www3.sympatico.ca/bkeevil/sigdoc98/index.html*)

Using Median Dwell Time instead of Averages

Median dwell time measures how long people are on a Web site, measuring both the users who stayed longer on the site and those who stayed shorter evenly. Measuring 'median dwell time' is often much more useful than determining average time online. Averages tend to be distorted by Web site visitors who either quickly come in or leave a Web site, or arrive onto a Web site and view every page.

Conclusion

The analysis of The Engagement Factor from a statistical perspective models a holistic, comparative approach to measuring user 'engagement.' The analysis also highlights ways in which each VMC product in the sample may, or may not, provide quality in online experiences for its users. Since the VMC was launched in the spring of 2001, a large volume of statistical reports has been produced daily, monthly, annually. To better interpret them and understand their meaning, it would be more helpful if notes are written on each statistical report, which indicate factors that are impacting on fluctuations. Next, it is important to attempt to get a better sense of what variables may be having an influence on VMC products at a museum, community, or educational level.

High Engagement using The Engagement Factor seems to be more reflective of traffic level to a Virtual Exhibit or Game, and the popularity of VMC's Virtual Exhibits is strongly linked to how, and how long, they are registered in Search engines. This is a starting point for considering user engagement on a Web site. However, Engagement Factor needs to be considered in the context of all of the other factors impacting on user engagement for a VMC product, and seen as one of many factors that contribute to understanding quality in online user experience.

It seems unlikely that a common template could be developed to ensure that there is quality of visitor experience in an online product. However, there are important lessons to be learned from the sites in the research sample, which could inform the development of new online products. The more in-depth qualitative analysis of models and frameworks, successes, user Feedback messages, and potential best practices proposed by the project managers and multimedia developers for these VMC products have provided insights into factors that impact quality in online experiences for museum users.

Issues to Explore in the Future

As a follow up to the *'Quality' in Online Experiences Research*, the following are issues that should be explored in the future to ensure consistency and high quality for the users of VMC products. Included are issues about measuring 'quality' from quantitative and qualitative perspectives, and implications of the research for museum and heritage organization partners, and multimedia companies developing and producing VMC products.

1. VMC Portal Statistics

Notes on each set of statistics (daily, monthly, and annually) would provide some context for fluctuations and a better sense of anomalies, fluctuations, and outliers. Notes could explain:

- When VMC products have been Featured and Marketed
- Seasonal differences
- Events in a local community, provincially, nationally, or internationally
- Events in museums
- The time of the year when the topic tends to be covered in the elementary or secondary curriculum
- Feedback messages that indicated the topic is of particular interest for courses or researchers at the college or university level.

Further research related to Engagement Factor could be on:

- Duration of time, which seems to be the most significant indicator of quality in online experiences of the three Engagement Factor statistics (i.e., Visits, Visitors, and Duration).

- Comparing the amount of time users are spending on different language versions of a VMC product. For example, users spend more time on French and Spanish versions of *Panoramas: The North American Landscape in Art* than on its English version (11:18 Fr., 7:56 Sp. vs. 4:43 Eng.) and there are much fewer numbers of Page views, Visits, and Visitors in French and Spanish versions.

- Determining Engagement Factor rankings. Should they be based on the lowest common VMC denominator – English and French versions – or is it more important to analyze a VMC product holistically because there are shared elements across languages?

- Months of high traffic for a VMC product (e.g., number of hits, Page views, Visits, and Visitors), which also have lower Engagement Factor indicating that many users are attracted to a site but visiting briefly (i.e., their initial browse does not 'hook' them to spend more time exploring the site).

- How users interested in online museums search the Web. What motivates their search, what interests them, and what sites do they choose to explore further?

Where users go after a visit to a Virtual Exhibit or interactive game, both to other Landmarks on the VMC portal and outside the VMC could be tracked. This would provide a better sense of the outcome of users' visits, or what users become interested in as a result of their online visit (e.g., the Teachers' Centre, specific images in the Image Gallery, related Museums or Events, @Boutiques, or related Virtual Exhibits and Games).

2. VMC Feedback Messages & Types of VMC Products

Decision-making about the type or types of user interactions for a VMC product early in the planning stages

- It may be most effective to choose which primary type of experience users will have in their interactions with a Virtual Exhibit or Game (e.g., Invite Critical Reaction and Creative Process; or Experience Rich Resources), and focus on development of content and technology that will ensure quality online experiences for that type of product.

- The development team could then consider how they will help users interact with VMC products in other ways (e.g., Obtain information, Learn / Experience, Experiment, Exchange ideas).

- When one product represents a range of different types of opportunities and experiences, the more it is providing multiple entry points, powerful analogies and metaphors, and multiple representations of core ideas (Gardner, 1999). It is important to consider Gardner's framework for generating meaningful, engaging experience for online users, as well as constructivist ideas that help individual users build on prior knowledge and experiences in meaningful ways (Soren, 2004b).

- Working with a clear, simple, and compelling story and theme is very important, as is experimenting with new technology that is inclusive of international users.

Involving target users for a VMC product in a systematic process of evaluation using front-end, formative, and summative user testing. Because of tight schedules, development teams tend not to collect this invaluable feedback. If user testing is done too late in the production schedule, it is difficult to make changes. It may be useful to involve VMC Members and Friends in evaluating the content and design of the VMC site, Features, Marketing, and individual products.

Providing users with an initial context about a VMC Product
- A wide range of VMC products have been developed since 1995. The Credits provide some of this information, but it is embedded quite deeply in the site. It would help to have immediate information about:
  - The date the site was launched.
  - How the site was developed (executive produced, commissioned, a VMC Investment Program, or a Community Memories exhibit).

3. Museum and Heritage Organization Partners, and Multimedia Companies

Providing museum partners with advance knowledge of expectations related to user engagement and how engagement is being measured. Multimedia developers receive specifications from project managers, but partners also need helpful guidelines or documents about things to consider when working on a large project with many partners.

Considering if there will be potential conflict between identified and interested audiences (e.g., youth and lifelong learners). A youth-driven mandate requires partners to write information for this audience, which may alienate other interested audiences.

Sending statistics and Feedback messages about their site to museum and heritage organization partners and multimedia developers. They can see how the site continues to do as a VMC product, and learn from that information in producing other sites. They can reflect on their own experience, how project partners developed and produced content, and what they felt did and did not work.

Providing partners and multimedia developers with a summary of Feedback messages for similar VMC products (e.g., target market; model, framework, and strategies for engaging users). This information may help teams better understand target users' prior knowledge and experiences, personal and professional interests, and motivations for visiting a site. They can also examine Feedback messages over multiple exhibits to see where gaps are and what users are asking for.

Providing reflection and evaluation opportunities after launch of a VMC product for follow-up conversations, gatherings, or surveys to see how museum partners used the experience of developing a Web site. These would be beneficial for assessing the impact of a VMC product on the museum community, nationally and internationally. It would also be useful for the development and production team to know what criteria are used to submit some VMC products for competitions and how CHIN features and markets a VMC product.

Towards Future VMC Products…

This research on *'Quality' in Online Experiences for Museum Users* indicates that there are a variety approaches to providing quality online experiences. The Engagement Factor is one of several ways used to measure performance of an online product and can be used as a tool to measure how museum Web sites attract international users and engage them over a period of time. 2004 marks the 10th anniversary of Virtual Exhibits for CHIN (planning for *Christmas Traditions in France and in Canada* began in 1994). During these ten years CHIN has enabled many museum and heritage organizations globally to have an online presence. Hopefully this research will provide insights into how future online products can consistently provide world wide users with quality online experiences.

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