WEB 2.0 AT THE MUSEUM OF LIFE AND SCIENCE

**Final Report for the *Take Two Institutional Research Study*
at the University of Washington**

Selinda Research Associates, Inc.

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ABSTRACT

The *Take Two Institutional Research Study* was an ethnographic case study of the contributions of Web 2.0 philosophy and technologies to museum practice and staff development at the Museum of Life and Science in Durham, North Carolina. It used a naturalistic methodology to investigate staff members' relationships with each other and their publics as the Museum developed and embraced a philosophy of Web 2.0 experimentation, shared authority, and co-creation.

An important element in developing Web 2.0 culture at the Museum of Life and Science was leadership that encouraged experimentation and risk-taking. As part of that supportive leadership, a key position was the Director of Innovation and Digital Engagement, who was both a source of technological knowledge and a leader in staff development. This individual also worked to build a sense of community among Museum staff.

A core group of early Web 2.0 adopters expanded as other staff became deeply involved with new experiments, and a larger community of practice emerged, encompassing both professional and personal lives. While embraced by most staff, this overlap between professional and personal lives created some tensions within some departments.

The Museum strove to create a culture of observation, documentation, and sharing by acknowledging the wide range of people—staff, non-staff, and visitors—who had authority to speak for and about the Museum. The criteria for the success of Web 2.0 experiments included numbers served and whether adult audiences were engaged. Short-term planning for and implementation of Web 2.0 experiments was constant and rather informal, but longer-range planning was a challenge.

The model for Web 2.0 development at the Museum was as much about defining and developing an organizational culture as it was about applying Web 2.0 technologies. A key characteristic of this culture was the use of Web 2.0 technologies to listen rather than to promote a particular idea. This required a willingness to give voice to others, to embrace widely shared authority, to experiment, and, when necessary, to tolerate failure.

This study focused on a single institution. It did not compare the efficacy or advantages and disadvantages of this particular approach with other models currently in existence.

EXECUTIVE SUMMARY

Overview of the *Take Two* project. *Take Two* was a multi-year study of the contributions of Web 2.0 philosophy and technologies on museum learning and museum practice, funded by a National Leadership Grant from the Institute of Museum and Library Services. As part of the larger *Take Two* project, and under the direction of Dr. Kris Morrissey at Washington University, the *Take Two Institutional Research Study* (*TIRS*) was a facilitated self-study of the contributions that Web 2.0 philosophy and technologies made on museum practice and staff development at the Museum of Life and Science (MLS) in Durham, North Carolina. This study reflected on issues of institutional identity, sense of authority and authenticity, the co-creation of knowledge, and the nature of relationships within MLS and between the Museum and its realized and potential audiences.

Methodology and methods. *TIRS* was an ethnographic case study of how MLS staff members' relationships with each other and their publics evolved as the Museum embraced a philosophy of experimentation, shared authority, and co-creation. A naturalistic methodology was used, including triangulating qualitative and quantitative data from a variety of sources to develop a thorough understanding of participants' experiences. Data collection took place from early spring 2008 through late spring 2010 and included a site visit to MLS, several rounds of depth interviews with MLS staff, and continuous monitoring and a final review of MLS online initiatives.

Description of the Museum. Referred to during its early history as the "Children's Museum," the Museum of Life and Science evolved to become an indoor and outdoor science and technology museum that included an operating railroad and outdoor and indoor exhibits of live animals. MLS's mission was to "create a place of lifelong learning where people, from young child to senior citizen, embrace science as a way of knowing about themselves, their community, and their world." Web 2.0 development focused on two aspects of the mission: lifelong learning, and science as a way of knowing. Families with young children and museum members were both important audiences at MLS, but the Museum was also reaching out to adult audiences to fulfill its mission to support lifelong learning.

Overview of Web 2.0 at MLS. Web 2.0 development at MLS preceded the *Take Two* project, with two blogs and a YouTube channel created during 2007. Shortly after the project began, grant funds were used to partially fund a newly created position. The Director of Innovation and Digital Engagement (DIDE) position was located within the Division of Innovation and Learning, and proved to be a key part of the *Take Two* experiment at MLS. A major component of the Web 2.0 culture at MLS was the incorporation of digital technologies into many aspects of life at the Museum and beyond, using already existing and readily available platforms such as Facebook, Twitter, Flickr, and YouTube. This took place on two fronts: one with the Museum's public, and one internally. Adult audiences were a major focus of Web 2.0 initiatives.

Experimentation and risk. A major non-technology component of developing a Web 2.0 culture at MLS included trying out new ideas, even when that entailed taking risks. Most Web 2.0 initiatives began as experiments whose risks were mitigated because staff had their leaders'

permission to fail. MLS also limited overall risk by supporting experiments in areas that were not critical to the organization's operations, but that could become integral if proven effective.

Role of the DIDE. The creation of the Director of Innovation and Digital Engagement (DIDE) position was central to the development of Web 2.0 at the Museum. This staff member served as an important source of technological knowledge and creativity, but was not always the source of the core ideas that were realized through Web 2.0 initiatives. For example, many initiatives often started with low-tech or no-tech ideas developed by staff members who were closely engaged with Museum visitors, and then were developed in partnership with the DIDE to bring the initiatives online. An important contribution of the DIDE was the deliberate effort to create a community of MLS staff, using a variety of innovative techniques and approaches. The DIDE provided an important role-model for technical exploration and use in ways that developed both individual staff and the Web 2.0 community of practice.

From core group to community of practice. A core group of early Web 2.0 adopters predated the DIDE's tenure. That core group expanded after the addition of the DIDE as other staff members took an interest in and became deeply involved with developing and managing Web 2.0 initiatives such as blogs, Facebook postings, and tweets. Other staff members were part of a larger community of practice that surrounded, supported, and was supported by the core group. The community of practice also grew in ways that assimilated Web 2.0 into staff members' outside-work lives, such as Friday afternoon gatherings at a local bar. This professional/personal crossover was not considered something new, but rather an extension of an already-existing museum culture.

Bridging the gap. An important consideration throughout the *Take Two* project was to encourage members of the online communities to participate with the physical museum. To bridge the gap between their online communities and the Museum's exhibitions, selected bloggers, Twitter followers, and Flickr subscribers were invited to special events at the Museum, including the *Dinosaur Trail* opening and a special, adults-only event in *Contraptions*.

Shared authority and co-creation of knowledge. MLS strove to create a culture of observation, documentation, and sharing by staff, Museum visitors, and users who participated online. This approach embraced the wide range of people who spoke for and about the Museum, and acknowledged challenges brought on by sharing authority in the context of Web 2.0. An important aspect of the Web 2.0 culture at MLS was also the notion of co-creation of physical and intellectual products, both in the Museum and online.

Judging success. MLS staff used a range of criteria to judge the success of Web 2.0 experiments such as (a) how many users were engaged, (b) who was being served, (c) alignment with MLS's social participation goals, (d) staff-time requirement, (e) the development of staff competencies, etc. MLS staff regularly reviewed what they were doing and sometimes dropped experiments that seemed unsuccessful. Usage statistics were gathered and shared, and staff held informal one-on-one discussions with the DIDE about experiments they were involved with.

Future plans. Short-term planning related to *Take Two* was constant and rather informal. When MLS staff had an idea, it could move from the discussion phase to online experiment in a matter

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of days or weeks. Longer range planning was a challenge, in part because ideas had to be flexible so they could adapt to the constantly changing Web 2.0 environment. Grant funding proved to be critical for the continuing development of Web 2.0 at MLS, because the *Take Two* grant matched about half of the DIDE position's salary, and this position turned out to be crucial to achieving the goals set forth in the *Take Two* project. A major key to the development of the Web 2.0 culture was the museum staff, so when new staff members were hired, consideration was given to applicants' potential for contributing to and embracing a Web 2.0 culture.

Lessons learned. A number of components proved to be critical to the successful development of the Web 2.0 culture at MLS. These included: creating and hiring the Director of Innovation and Digital Engagement (DIDE) position; focusing that position on innovation and learning rather than marketing; embracing experimentation and risk-taking; using Web 2.0 to listen as much as (or more than) for talking; using existing applications; providing adequate technical support; focusing on adult visitors; cultivating institution-wide commitment, opportunities, and participation; and ensuring adequate funding.

INTRODUCTION

Overview of the *Take Two* Project

The *Take Two* project was a multi-year study that examined the relationship between Web 2.0 technologies and museum learning and practice, funded by a National Leadership Grant from the Institute of Museum and Library Services. The *Take Two* project core team was composed of fifteen individuals, identified by name on the inside front cover of this report. Begun in October 2007, the project ended September 2011.

The *Take Two* project had three major components: (a) a series of gatherings to discuss and document the evolution of the core team's thinking about and understanding of Web 2.0 technologies and the implication for research and practice; (b) a Michigan State University led research study that used discourse analysis to examine user interaction, co-creation of knowledge, and identity building within the Science Museum of Minnesota's popular blog, *Science Buzz* (Grabill, Pigg, & Wittenauer, 2009); and (c) the University of Washington led *Take Two Institutional Research Study*, an examination of the contributions that the implementation and adoption of Web 2.0 technologies made to museum practice and staff development at the Museum of Life and Science in Durham, North Carolina. This report describes the *Take Two Institutional Research Study* only.

Overview of the *Take Two Institutional Research Study*

The *Take Two Institutional Research Study* (*TIRS*) was envisioned and led by co-PI Dr. Kris Morrissey at the University of Washington. It focused on interactions that took place within the Museum of Life and Science in Durham, North Carolina (MLS) as it (a) installed a *Science Buzz* kiosk (produced and run by the Science Museum of Minnesota) and (b) made a staff-wide commitment to a philosophy and practice of Web 2.0. The Museum engaged in a facilitated self-study of the impact of Web 2.0 technologies on staff and audience development and learning. This study reflected on issues of institutional identity, sense of authority and authenticity, and the nature of relationships within MLS and between MLS and its many realized and potential audiences.

The initial research question was phrased as follows:

> *What is the impact of adopting Web 2.0 on museum practice at MLS? As the institution changes its approach to authority over content and interactions with the public online, how do practices on-site change?*

Over the two-and-a-half year span of the research study, the question evolved to become:

> *In what ways and to what extent has the adoption of Web 2.0 technologies at the Museum of Life and Science contributed to and helped shape the ongoing evolution of the organization and its culture, institutional identity, ways of doing business, and educational philosophies?*

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This research study was an ethnographic case study of how MLS staff members' relationships with each other and their audiences evolved as the Museum embraced a philosophy of experimentation, shared authority, and co-creation. It is important to note that this study's emphasis was on the development of Web 2.0 culture, not the use of Web 2.0 technologies. This was an important guiding philosophy throughout the *TIRS*.

METHODOLOGY AND METHODS

A research method is a technique for (or way of proceeding in) gathering evidence…A methodology is a theory and analysis of how research does or should proceed. (Harding, 1987, p. 2)

A naturalistic *methodology* was used for this study. Naturalistic inquiry uses a rigorous and systematic approach for collecting and analyzing data in real-life settings. The goal of naturalistic methodology is to provide a holistic understanding of participants' experiences from a variety of perspectives and using a variety of *methods* (Lincoln & Guba, 1985). In this case, it included collecting both qualitative and quantitative data from a variety of sources and triangulating the data to develop a thorough understanding of the various participants' experiences. One of the strengths of naturalistic evaluation is that unanticipated findings often emerge from the data. A naturalistic methodology allowed the researchers to follow up on threads and themes that characterized how respondents thought about their experiences.

Naturalistic inquiry is guided by a different set of criteria than experimental or positivistic research. In judging the quality of a particular naturalistic study, constructs such as credibility, transferability, dependability, and confirmability take the place of more familiar constructs such as reliability, validity, and generalizability (Allen, Gutwill, Perry, Garibay, Ellenbogen, Heimlich, *et al.*, 2007). Every attempt was made to ensure this study adhered to the highest standards for naturalistic evaluation. Any exceptions are described in the Limitations section below.

Research Design

To guide this research, a detailed topical framework was developed and later revised as the needs of the project evolved (see Appendix A). A topical framework is an outline of issues, or topics, that the team wishes to explore. While every attempt was made to identify as many issues as possible at the beginning of the study, the topical framework evolved during the project to include new topics that emerged during the process of data collection.

Data collection
Data collection for this study included a site visit to MLS by one member of the research team, several rounds of interviews with MLS staff, a review of existing documents, and a review of MLS social media and online initiatives, including continuous monitoring of them throughout study (see Appendix B).

The first phone interviews took place in 2008. The site visit took place on September 23 and 24, 2008, and included the second round of interviews, this time with groups of MLS staff selected because they shared similar responsibilities or were working on a particular project. A mid-project interview took place in spring 2009. The final round of phone interviews was completed during March and April of 2010. Both MLS staff and *TIRS* researchers monitored the various MLS social media and online initiatives from summer 2008 through winter 2010. A final review of the social media and online initiatives and the written documents was completed spring 2010.

Respondents

Because the goal of naturalistic inquiry is to describe a wide range of experiences, *purposive sampling* was used in this study instead of the more familiar *random sampling* (Miles & Huberman, 1994). In purposive sampling, respondents are deliberately picked because they are deemed likely to have a unique or particularly interesting perspective or experience, i.e., one that is different from previous respondents.

> *The goal of purposive sample is to ensure that a broad range of audience diversity is included in the study, and that the interactions with any particular respondent are extended and rich.* (Allen *et al.*, 2007, p. 238)

Respondents for *TIRS* included 21 purposively selected staff members drawn from all levels of the Museum's hierarchy. Most, but not all, respondents were selected because they had been active contributors to one or more of the many online initiatives at MLS. Others were selected because they supervised the contributors, or because they had not yet participated in Web 2.0.

Two MLS staff members played a unique role in the *Take Two* project, serving as both respondents and partners in the research. The Vice President for Innovation and Learning (VPIL) at MLS was a partner on the project since its inception. He participated in many initial discussions about the project, contributed to its ongoing evolution, and participated in most team meetings, from the project's inception onward. MLS's Director for Innovation and Digital Engagement (DIDE) was brought on after the project began, but then played a very active role in its evolution. She gathered and analyzed most of the quantitative data examined during the *TIRS* project, continually reflected on her experiences both online and off, became the public face of Web 2.0 at MLS, and participated in many of the team meetings. Both the VPIL and the DIDE also served as respondents for this study, and reviewed a draft version of this report.

Because this study focused on the experiences and perceptions of MLS staff, no visitors or online users were interviewed.

Methods

In accordance with standards for conducting naturalistic evaluation, a number of data collection methods were used in this research study. Each strategy is briefly described below. (For an overview of all data sources, see Appendix B.)

Depth interviews

Depth interviews were an important source of data for this study (Lincoln & Guba, 1985). The depth interviews were open-ended interviews conducted with respondents. Depth interviews began with a protocol, or general outline of issues to be explored, but during the course of the interview unexpected twists and turns were sometimes taken and unanticipated leads were followed up. These interviews often felt more like conversations than inquiries and lasted for as long as both the researcher and respondent desired. Interviews ranged from 15 minutes to over an hour in length.

The advantage of depth interviews is that a strong rapport and trust is often built between the researcher and each respondent, resulting in a rich and intimate understanding of respondent experiences that is difficult to achieve with other more structured interview protocols. Depth interviews also allow unanticipated findings to emerge, helping to ensure that the findings accurately reflect the complexities and subtle nuances of a respondent's experiences. A disadvantage of depth interviews is that they require *prolonged engagement* and consequently take a long time to conduct.

In this study a total of eleven depth interviews were conducted for a total of 13.5 contact hours. Some interviews were extended through follow-up emails. Contact hours included only the time actually spent with the respondent. They did not include time spent in follow-up emails, or writing debriefs (see *Data analysis* section below).

Group interviews
During the site visit to the Museum, group interviews were used to gather data about the experiences of MLS staff. Similar to one-on-one depth interviews, the group interviews were open-ended and structured more like conversations than formal interviews. The group interviews also began with a general protocol and followed unanticipated leads when they arose.

An advantage of group interviews was that the researchers gained an understanding of the dynamics within groups of staff with similar responsibilities or who were collaborating on the same project. Also, respondents had the opportunity to hear what their colleagues shared about their experiences and thus reflect in different ways on their own experiences. A disadvantage was that some staff may have been less apt to participate fully in the conversation and some may have been less willing to share certain types of experiences in front of their colleagues.

Four group interviews were conducted, with key administrative staff, educators, Animal Department staff, and an inter-departmental team working on an exhibition. Group size varied from three to seven individuals, with a total of 21 staff participating. (A few individuals participated in more than one interview.)

On-site observations
During September 2008, site visit researchers viewed and photographed the facilities and exhibitions at the Museum (see Appendix C). These observations helped researchers develop their understanding of the context within which MLS's Web 2.0 initiatives developed.

Monitoring and review of online initiatives
Both MLS staff and *TIRS* researchers monitored the various online initiatives, following Twitter, Facebook, and blog posts, and other online initiatives more-or-less as they happened. In addition, MLS staff often e-mailed the researchers to call attention to particularly interesting postings and events. MLS staff also collected and analyzed usage statistics for the online initiatives. This is discussed in more detail later in the report.

In preparation for writing this report, researchers conducted a final review of online initiatives during spring 2010. A narrative description of the Web 2.0 and related online initiatives is included as Appendix D. A chart with links and other data about the major initiatives is available in Appendix E and Appendix F provides screenshots of major public initiatives.

Review of documents
As the researchers attempted to develop as complete a picture as possible, review of additional documents became an important component of the data set. In this study, documents that were reviewed included a wide variety of written and illustrated materials, including both printed and electronic documents (such as PDFs and SlideShare presentations) created by MLS staff.

Data analysis
Data analysis for this study was an on-going process using a modified inductive constant comparison approach whereby each unit of data was systematically compared with all previous units of data (Lincoln & Guba, 1985). Immediately following each interview, researchers wrote debriefs fleshing out their notes, reflecting on and analyzing their findings, comparing the interview data with data from previous data collection sessions, and developing preliminary conclusions. Analysis continued as data and findings were compared among the researchers and among data types. Researchers also held group debriefing sessions to triangulate findings and resolve any contradictions.

Although a variety of data collection strategies were employed, in accordance with standards for naturalistic inquiry these data were not treated separately but were integrated to develop a comprehensive and multi-faceted understanding of different issues from a variety of angles. The reader of this report won't find, for example, the results of document reviews or a summary of interview findings. Rather, the report discusses findings on a range of topics as spelled out in the topical framework, integrating all the data relevant to each topic into subsections of the report. The findings reported in this study are synthesized results that emerged from interviews, reviews of online sources and documents, and observations.

Presentation of findings
This study is a naturalistic case study. One of the strengths of this type of study is that it presents a narrative description of findings. In accordance with standards for naturalistic inquiry, the reader will find few tables, charts, graphs, or numerical statistics. All quotes are in respondents' exact words, except when indicated otherwise by square brackets.

Ethical treatment of respondents
The *Take Two Institutional Research Study (TIRS)* was conducted under the direction of Dr. Kris Morrissey at the University of Washington. As such, it was subject not only to the ethical standards that guide all Selinda Research Associates studies but also to review and approval by the university's Institutional Review Board (IRB). One of the primary functions of the IRB is to protect human subjects—in this case, the staff at MLS who were interviewed and contributed in other ways to this research.

As such, the researchers were obligated to write this report in a way that would protect respondents from any negative consequences of their participation, and that would, ideally, produce some benefit for them. This was explained to respondents in e-mails and during interviews. On the issue of confidentiality, respondents were promised that everything they said during interviews would be kept in confidence, accessible only to the researchers (excluding MLS staff). On the issue of possible benefits, respondents were told that indirect benefits might include having a chance to reflect upon their work and contribute to the wider museum field's understanding of how we can use Web 2.0 tools and culture to communicate with visitors and each other.

This report needed to preserve respondent confidentiality in a Web 2.0 world, when people voluntarily go public with much of their lives. This set up a dilemma: How can researchers protect respondents' privacy yet still give credit to the creative people on staff at MLS? Given this dilemma, the following strategies were used in the writing of this report:

- Names of respondents were not used in this report. When MLS staff members were referred to by name, it was because they were more than respondents; they were also partners in the research and co-authors of this report.

- Although two key MLS staff were partners in most of the research, only Selinda Research Associates staff had access to recordings and transcripts of individual depth interviews and to the correspondence surrounding these interviews.

- Every incident or idea was included in this report because there was evidence of it from more than one source. The findings were triangulated with several conversations and/or online and written sources. No findings were attributed to a single individual because no single person was solely responsible for them.

- Similarly, when quotes and paraphrases were used in the report, they were not attributed to a particular source. These words were chosen because they illustrated or clearly expressed a general point, not because they represented the feelings of a particular individual.

- Key staff at MLS reviewed the draft report and were free to veto any text that they felt compromised MLS staff confidentiality or put them or their colleagues at risk.

As far as recognizing the creative efforts of MLS staff, Appendix E includes links to most of the online initiatives developed over the past few years, including blog and other postings where staff have reflected on their Web 2.0 participation. By following those links, readers can "meet" many of these staff, learn more about what they've accomplished, and find out how they feel about it.

Limitations

It's important to note that this study is really a progress report on the development of Web 2.0 culture at the Museum. Definitive conclusions were not reached about many of the initiatives or approaches described in this report because they continue to develop and change. As this report

was written, some initiatives were expanding and becoming institutionalized and new initiatives were being developed and implemented. Some initiatives will doubtless be dropped before the report reaches a broad audience. Also, much of what was written about staff participation in Web 2.0 initiatives was from a time-limited perspective, since staff members continued to develop new interests and take on new responsibilities even as this report was being written. Therefore, lessons learned *to date* are described at the end of the report rather than trying to nail down the last word on the subject.

In this report, a number of links to online initiatives and resources have been included so that examples can be readily viewed. While all links worked as of May 2010, because this report is about the ever-evolving Web 2.0 the reader is advised that some of them may no longer be functional.

This study was necessarily limited in scope, due to the resources available. When conducting a research study using naturalistic methodologies, it is standard practice to continue collecting data until a state of redundancy is reached. Redundancy is the point at which no new information is gleaned, despite repeated attempts to elicit additional findings. In this study, redundancy was achieved for many of the issues listed in the topical framework. However, in some areas of the study researchers were unable to explore the issue in enough depth to reach redundancy. Issues that could not be resolved satisfactorily were either not included in the final report or were identified where appropriate.

FINDINGS: An Overview of the Museum of Life and Science

Our mission is to create a place of lifelong learning where people, from young child to senior citizen, embrace science as a way of knowing about themselves, their community, and their world.[1]

The Museum of Life and Science is located in Durham, North Carolina. Durham, along with the nearby cities of Raleigh and Chapel Hill, is part of North Carolina's Research Triangle, so named because this area is home to three major research universities: Duke University, University of North Carolina at Chapel Hill, and North Carolina State University. The Museum of Life and Science has developed partnerships with all three universities and with other education- and science-oriented institutions within the Research Triangle and beyond.

The Museum was founded in 1946 as a small trailside nature center. During its early history it was called the "Children's Museum," but it has evolved over the years to become a science and technology museum for all ages. In part, this was because the Museum accumulated scientific collections of dinosaur fossils and minerals as well as technological artifacts, like the Mercury Redstone rocket that sits in front of the Museum's current home (Fig. C-1). The Museum adopted the name "North Carolina Museum of Life and Science" during the 1970s, as it developed into an indoor and outdoor museum that included an operating railroad and outdoor exhibits of large animals. Significant expansions occurred in the 1980s and 1990s, including adding an indoor nature center with live animals and a Science and Technology Wing.

A strategic plan implemented over the past decade included development of the two-phase *BioQuest* project.[2] Phase One included opening the *Magic Wings Butterfly House* (Fig. C-2), a three-story conservatory with tropical butterflies and plants, learning labs, and an Insectarium. Phase Two opened three major outdoor exhibitions on a 10-acre site within the Museum's overall 84-acre campus: *Explore the Wild* (Figs. C-3 though F-6), *Catch the Wind* (Fig. C-7), and the redeveloped *Dinosaur Trail* (Fig. C-8), a two-acre outdoor space that includes life-sized models of Cretaceous-age dinosaurs and a fossil dig site where visitors find and take home their own small fossils. A new large indoor exhibition, *Contraptions*, was under development during this study, moving from prototype (Fig. C-9) to public opening over the final year and a half of the study.

It should be noted that the mission statement quoted above was demonstrated to be an integral part of the Museum. Most respondents related and justified nearly all their job activities, and all the things they saw visitors doing at the Museum, back to the mission. The aspects of the mission that were mentioned most often in relation to *Take Two* were (a) lifelong learning, and (b) science as a way of knowing. These two concepts are referenced repeatedly in the rest of this report.

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[1] Retrieved from the Museum's website, March, 2010.
[2] The ASTC ExhibitFiles website has a case study of this project at http://www.exhibitfiles.org/bioquest_woods

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Staff Roles and Organizational Structure

At the time of this study, the Museum of Life and Science employed approximately 70 full-time staff. As seen in the simplified organizational chart (developed by the *TIRS* researchers and included in Appendix G), the Museum included four major divisions, each supervised by a vice president. Directors for the various departments reported to the vice presidents, and the titles of the staff members who reported to the various directors varied according to their areas of responsibility.

Three of the titles for the vice presidents will be familiar to most museum professionals, but the fourth, the Vice President for Innovation and Learning, is one rarely encountered in the museum world. At MLS, this position was particularly influential in the envisioning and development of the Web 2.0 culture. It was interesting to note that while some museums consolidate their educational functions within a single division, the Family and School Experiences staff at MLS reported to the Vice President for Innovation and Learning, and the Learning Communities/Educational Resources staff reported to the Vice President for Administration/CFO. As can be seen in the chart in Appendix G, the Vice President for Exhibits and Planning supervised both the staff who developed and maintained the indoor and outdoor museum exhibits, and the staff who cared for living animals and plants in what amounted to a small zoo and conservatory.

The key position for Web 2.0 development at MLS was the Director of Innovation and Digital Engagement (DIDE). As of the writing of this report, this position reported to the Vice President for Innovation and Learning (VPIL). The responsibilities for these two positions are discussed in depth in later sections of the report. It is important to note that the staff with whom the DIDE worked on Web 2.0 initiatives—i.e., the staff members who produced and managed content for Web 2.0 (those positions marked by asterisks in Appendix G)—were scattered throughout the organizational chart. For example, the staff members who wrote blogs for the Museum worked in Guest Relations, the Science Education Resource Center (SERC), and the Animal Department, not directly for the VPIL.

Several additional Web 2.0 initiatives were inspired by and/or run by staff in Exhibits and Planning, and by the Director of Membership Advancement. The Director of Marketing was also an important player throughout the project. In short, Web 2.0 at MLS was (and continued to be as this report was written) an organization-wide phenomenon, with indications that it would continue to be so for some time to come, with additional staff members becoming increasingly active participants.

Museum Audiences

During the time of this study, the staff at the Museum of Life and Science focused their efforts on three audience segments: *families with young children*, *museum members*, and *adults*. *Families with young children* comprised the largest segment of MLS visitors. Perhaps this should not be surprising, given that MLS was originally a children's museum, and most modern science museums primarily serve this audience.

The Museum also had a strong focus on serving *museum members*. Shortly before this study began, MLS had developed a Membership Model. It described members as the Museum's primary customers because, as repeat visitors, members were most apt to achieve the Museum's goals for lifelong learners. Perhaps because of this focus, when this study began, membership and membership-related revenues had been growing for several years.

It should be noted that these first two audiences overlapped substantially because most of the members were families with young children or grandchildren.

Although it was widely accepted that most visitors to the museum came with young children, the Museum also was committed to fulfilling its mission of providing life-long learning opportunities by reaching out to *adult audiences*. Staff indicated that meeting this challenge required developing programs especially for adults, not just "watered down versions of things that were developed for children and their families." One of the more successful efforts was an adult-centered café-style science lecture and discussion series, called *Periodic Tables*. As explained on the *Periodic Tables* website (in 2010):

> *Periodic Tables* is a monthly gathering where curious adults can meet in a casual setting to discuss the latest science in plain English. At *Periodic Tables*, you will chat with your neighbors and local experts about interesting and relevant science happenings right here in the Triangle and beyond. No lengthy PowerPoint presentations, no drawn-out seminars, no confusing jargon. Simply smart and relevant science in a relaxed atmosphere. Eating and drinking are encouraged, and there is no such thing as a stupid question.[3]

In part because of the difficulty of attracting adults to the Museum, the adult audience was a major focus of Web 2.0 initiatives.

Origins and Evolution of MLS's Web 2.0 Initiative

The origins of *Take Two* at the Museum of Life and Science really can be traced back to 2004 when a new President and CEO took charge at the Museum. He began shaping the Museum's culture in ways that led ultimately to the MLS Web 2.0 development model, which stressed experimenting with new ideas and new approaches to engaging with the public. A key step in this process was the reorganization of the Museum's hierarchy (Appendix G) and the hiring of a Vice President for Innovation and Learning—a position not found in most museums.

Within this context of re-inventing the Museum, MLS staff developed an interest in Web 2.0 applications more than a year before this study began. (See Appendix H for a timeline of major Web 2.0 events at MLS, and Appendix D for descriptions of Web 2.0 and related initiatives at MLS.) During the winter of 2007, an interdepartmental team of MLS staff brainstormed ideas for Web 2.0 applications at the Museum and decided that an MLS blog would be a good way to start. They asked for volunteers and found Animal Department staff interested and willing to

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[3] For more information about this program, see http://www.ncmls.org/periodictables. Web 2.0 aspects of this program are discussed in a later section of this report.

give the idea a try. After a six-month trial period, during which the blog was written only for fellow Animal Department staff and eventually other MLS staff, the blog went public in October 2007. Additionally, during the summer of 2007, MLS opened its YouTube account and posted its first YouTube videos. A second blog, *Greg Dodge Journal*, began publishing in spring 2008.

In addition to these early discussions and forays into Web 2.0 technologies, during 2006 and 2007 MLS staff began talking with Science Museum of Minnesota (SMM) staff about potential cooperative projects, including SMM's popular *Science Buzz* blog-centered website and series of exhibits about current science.[4] Preliminary plans were made to install two *Science Buzz* kiosks in MLS exhibits: one centered on health in the Museum's *Investigate Health* exhibition and a second kiosk focused on energy and the environment. At the same time, the larger *Take Two* project was in the planning stages and was looking for a museum that could serve as a case study of Web 2.0 adoption. MLS became part of the grant proposal to the Institute of Museum and Library Services and was chosen as the subject for this study.

At the beginning of the *Take Two* project, a *Science Buzz* kiosk was installed in *Investigate Health* in January 2008, with unexpected results. Although no formal evaluation of the kiosk was undertaken, MLS staff who regularly watched visitors use the kiosk noted that many visitors would sit down for a few seconds and click a story but not really read it. Instead, visitors were most often seen using a feature that allowed them to take a picture of themselves and send it as a postcard. Although adult visitors sometimes were observed talking about the health stories as they read them, there were indications that most visitors did not realize that *Science Buzz* also served as a forum where they could participate in online discussions. MLS staff felt that the use of the *Science Buzz* kiosk did not engage visitors as expected at least partly because it was "not in a great location," i.e., it was in a place where people waited for others in their group to use the *Investigate Health Lab* or a restroom.

Perhaps most important from the viewpoint of MLS staff, the *Science Buzz* kiosk, as it was installed and used at MLS, seemed static, unlike the approach to digital engagement the Museum aspired to. They contrasted the kiosk with what they saw as the more active, ever-changing approach they were beginning to take with Web 2.0, as described in the next section of this report. During this time, MLS staff described the *Science Buzz* model as fixed-format, closed, and proprietary, and requiring "technical, spiritual, and emotional" care beyond the initial monetary cost. It began to appear that *Science Buzz* would serve as a source of inspiration for MLS staff by showing them a path they did not want to follow.[5]

The path MLS wound up following was greatly influenced by the funding provided as part of the *Take Two* project. Those funds were used, in part, to create a staff position dedicated to Web technologies at the Museum. The creation of this position was a deliberate experiment, and was

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[4] The *Science Buzz* website can be accessed here: http://www.sciencebuzz.org/
For an *ExhibitFiles* case study of Science Buzz, go here: http://www.exhibitfiles.org/science_buzz
Go here to read more about the *Science Buzz* kiosk installed at several museums around the United States: http://exhibits.smm.org/wiki/display/buzz/Home
[5] As this report was being written, a single *Science Buzz* kiosk was still installed in *Investigate Health*. Visitors used it to view current news stories about health-related issues, but it was not a major player in MLS's Web 2.0 initiatives.

initially titled the Director of Web Experience. It was filled in July 2008 by an individual who was specifically chosen for her leadership qualities and knowledge of Web 2.0 technologies and culture.

The MLS approach to Web 2.0 really began to take shape after this Director of Web Experience was hired. An important component of this approach included the decision to use already existing, free, *social media* platforms. The Museum's initial foray into Web 2.0 (the *Animal Department Blog*) required the use of a third-party platform because the technical know-how was not available in-house. After the new Director of Web Experience came on board, based in part on the Museum's initial experiences with the *Science Buzz* kiosk, and in part on internal discussions among MLS staff, a philosophical decision was made to continue to use already existing, free, *social media* platforms, as that approach seemed the best way for a non-profit organization like MLS to "get any scale in Web 2.0."

Shortly after the Director of Web Experience came on board, the title for the position was changed to Director for Innovation and Digital Engagement (DIDE) as a more accurate description of the job's responsibilities. The DIDE described her role at MLS as "an agent for institutional change using Web technology," and explained that her position gave her a mandate to innovate. The old "Web Experience" title seemed too broad in some ways, and too limiting in others.

> Many projects [that don't fall under this position, for example] redesign a birthday party site, help us figure out ways to sell online tickets, etc., fit into "experience" and are certainly "web." We use the words "innovation" and "engagement" to focus on experimentation and learning and the word "digital" to branch out from the concept of just a website, but also [include] digital exhibit componentry and mobile device use.

An Overview of Web 2.0 Initiatives

During the time of this *TIRS* study, the major Web 2.0 undertakings consisted of both *public* and *internal* initiatives. Major public initiatives included the Museum's three blogs—the *Animal Department Blog*, *Greg Dodge Journal*, and *The Science Education Blog*—and social media accounts on Facebook and Twitter. MLS staff also developed initiatives on the photo-sharing website Flickr; posted online videos, mostly on YouTube; and bookmarked Web links using Delicious and FriendFeed. Access to these public initiatives was through the Museum's website, which was redesigned to highlight Web 2.0 initiatives.

To integrate these initiatives with visitors' museum experiences, staff developed a range of online initiatives related to two new exhibitions: *Dinosaur Trail* and *Contraptions*. In addition, the adult program, *Periodic Tables*, was supported by a complex of Web and social media applications. To bridge the gap between their online communities and the Museum's exhibitions, selected bloggers, Twitter followers, and Flickr subscribers were invited to special events at the Museum, including the *Dinosaur Trail* opening and a special, adults-only event in *Contraptions*.

In addition to Web 2.0 initiatives designed specifically for the public, MLS staff developed online initiatives for their own use. Some of these were also made available to other museum professionals. For instance, *useum* was a blog on Tumblr, where the DIDE posted thoughts and comments on her work at the Museum, as well as links to online content produced by other MLS staff. The MLS Exhibits Department used Flickr to post photos of both newly opened exhibitions and exhibits under development. Other online initiatives were password-protected and available only to MLS staff, including a Museum intranet; IdeaScale, an online forum that allowed Museum staff to post ideas and suggestions for new initiatives; and Yammer, a microblog where staff posted work-related updates, comments, and announcements. With the DIDE's guidance, MLS staff developed online tools to facilitate their own work. Staff used information-sharing tools to work collaboratively on grants and developed their own websites to provide support and guidance to departmental volunteer staff.

The array of Web 2.0 initiatives at MLS is described in more detail in Appendix D. In addition, Appendix E includes data and links for all the initiatives in tabular form. Appendix F includes screenshots from many of the initiatives.

FINDINGS: The Museum's Overall Approach to Web 2.0

In embarking on this Web 2.0 project, two important components appeared to be critical: (a) the cultivation of a culture of experimentation and risk-taking, and (b) the creation of a full-time position dedicated to the project.

Experimenting, Taking Risks, and Permission to Fail

In collecting data for this study, it became clear that MLS leadership was firmly committed to cultivating a culture conducive to experimentation and risk-taking. Staff at the core of Web 2.0 at MLS described the organizational culture they were trying to cultivate as one that encouraged experimenting with new ideas even if that entailed taking risks. To encourage this development, the leadership at MLS worked to convince staff that they did, indeed, have permission to fail.

It was, however, important to note that not everything done at MLS was an experiment. MLS leaders emphasized that non-profits need to experiment in ways summarized by an IMLS (Institute of Museum and Library Services) phrase: "Chasing the edge and maintaining the core." That meant that non-profits, because they don't have large research and development budgets and staff, have a responsibility to participate in experiments in areas that are not on the organization's critical path to delivering their mission, but which could become part of the museum's core if proven effective. In other words, there appeared to be a commitment to the idea that science museums in general need to try things that might fail but "in ways that won't sink them." Science museums need to continue to try new experiments, prove which initiatives are something they want to pull into the core of the organization, and find ways to fund them. At MLS, Web 2.0 was seen as an example of that kind of experimentation, risk-taking, and ultimately, change.

Sometimes in organizations, a new philosophy of risk-taking and experimentation is not perceived by the staff as possible when it comes to daily operations and individual accountability —even though leadership strives to be committed to organizational change. Staff at all levels of the MLS organizational hierarchy emphasized the roles of permission and trust in the Web 2.0 experimentation process, saying they felt their leaders gave them permission to do "little experiments," to take risks, and to trust their judgment on which directions to move next. They described that permission as coming from the top of the organization. We also heard this process called "entrepreneurship" instead of experimentation, but the overall approach seemed the same: Start small, try it out using an iterative process, and improve as needed to see if the idea can work.[6]

Indeed, as can be seen by the sheer number of online initiatives described in Appendix D, there were so many of them in part because Museum staff wanted to experiment with lots of new ideas and then, as one staff member put it, "see what sticks."

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[6] Note that some staff used the term "experiments" for the same MLS Web 2.0 activities referred to in this report as "initiatives" and "projects." However, since *Name That Zoom* and other Web 2.0 activities eventually moved beyond the experimental phase, the more generic terms ("initiatives" and "projects") are favored in this report.

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Role of the Director of Innovation and Digital Engagement

It was clear that an institution-wide culture and philosophy of experimentation and risk-taking was essential to the successful implementation of Web 2.0 at MLS. At the same time, however, this was not enough. The initiative also needed someone to take the reins and lead the endeavor. There were many indications that the Director of Innovation and Digital Engagement (DIDE) was central to the development of Web 2.0 at the Museum.

First, the DIDE was a source of technological knowledge and creativity. In the many initiatives described in Appendices D and E, she provided the inventiveness and expertise evident in the finished products. However, the DIDE was not always the source of the core ideas that were realized through Web 2.0 initiatives. In fact, initiatives often started with low-tech—or even no-tech—ideas developed by staff who were close to the Museum visitor. The DIDE position evolved into a kind of "safe person," someone staff could come to with ideas, so she could help them find the right technology to "wrap around" the idea and make it happen. Solicitation of ideas often took place in MLS staff meetings, and in one-on-one meetings between the DIDE and museum staff.

One example of this was when a staff member came to the DIDE with the idea of putting a video microscope camera online. The DIDE worked collaboratively with the staff member to create *Name That Zoom*, a game that adults played online. In this situation, the staff member had a microscope she knew was popular with visitors, and she wanted to use the microscope to engage users with authentic, fun science in an online format. She took her idea to the DIDE to try to figure out what to do with the microscope online.

Together the staffer and the DIDE decided to develop an online contest, but they wanted more than the sort of "follow us and win" contest they often saw organizations conducting on Facebook and Twitter. They decided to develop a contest for people who were already using Twitter and Facebook. To make it work, the DIDE created the following approach to the experiment: Users would follow the Museum on Twitter to find out when a new *Zoom* photo was posted on the Museum's Flickr page, and then they would try to figure out what was portrayed in the photograph. They would post their guesses using either Flickr or Twitter. By examining user profiles, the DIDE was able to discover that *Name That Zoom* succeeded in reaching an adult audience.

It was a common belief among MLS staff that adult audiences were difficult to reach with the sorts of family-friendly and child-focused exhibits that dominated the Museum's galleries. Thanks to *Name That Zoom*, the Museum learned that adult-focused online initiatives could interest adults in what the Museum had to offer, and thus help the Museum achieve its mission of becoming a place of lifelong learning. Based on this success, *Name That Zoom* was no longer considered an experiment, but was "pulled into the core."

The DIDE was involved in all the Web 2.0 experiments at MLS, although in most situations—as in the case of *Name That Zoom*—she most often partnered with other staff members to turn their ideas into online experiments. Once the experiments were up and running smoothly, the staff members usually took responsibility for maintaining them, continually updating them with new photos and other content.

As part of this research study, the researchers frequently considered what Web 2.0 at MLS would have been like without the DIDE position. During the initial stages of Web 2.0 development, there were a few tech savvy staff members, but no one who was "comfortable just jumping in and doing things," because "it seemed like there were too many [technological] barriers." The technologies seemed too complex and intimidating for staff to take on more than a few projects each year. With the DIDE in place, staff knew there was someone they could go to for help, someone who could say, "That's good, let's get started, let's try it out." Also, before the DIDE, Web 2.0 was self-taught, and there were many indications that adoption of Web 2.0 technologies and philosophies would have been slower if the DIDE had not been hired. As one staff member told us, "[the DIDE] made a big difference."

The DIDE's other major role involved more staff development than Web development. The data repeatedly indicated that the DIDE did a huge amount of work to help make MLS staff comfortable with both the philosophy and practice of Web 2.0. Building a sense of community among MLS staff, and educating that community about Web 2.0 was a primary focus of much of her work. That educational venture—which amounted to much more than conventional staff training—is the subject of the next section of this report.

FINDINGS: A Community of Practice

During the gathering of data for this research study, researchers were repeatedly struck by how Web 2.0 was not just about the technology but was also about the Museum staff who developed and used the technology. This group of staffers included some closer to the core of the Museum's Web 2.0 efforts as well as others just beginning to become active within an informally organized Museum community, one that shared interests and responsibilities. In this section, the evolution and functioning of this aspect of Web 2.0 is discussed.

From Core Group to Community of Practice

Prior to the *Take Two* project and the creation of a Director of Innovation and Digital Engagement (DIDE) position, there was a formally appointed but loosely organized cross-departmental team of staff members at MLS who were interested in Web 2.0 technologies. These folks included the team that helped organize the first blogs (i.e., *Animal Department Blog* and *Greg Dodge Journal*) and started the Museum's YouTube channel. They included the Director of Membership Advancement, the Exhibits Development Manager, the Manager of Public Engagement with Science, and the Director for Nanoscale Informal Science Education, with the Vice President for Innovation and Learning also playing a vital role. Although this core group of early adopters (Rogers, 1983) pre-dated the DIDE's tenure, over the next few years the core group expanded, first with the addition of the DIDE, and then increasingly as other staff members took an interest in and became deeply involved with developing and managing Web 2.0 initiatives. Interestingly, some key players in Web 2.0 at MLS did not consider themselves part of the core group. However, they did seem to be part of a larger community of practice that surrounded, supported, and was supported by the core group.

This larger community of practice grew in several ways. The DIDE's efforts focused on developing a large community of Web 2.0 practice at MLS that would extend well beyond the core group. For example, as discussed in the previous section, staff members came to the DIDE with ideas that they thought had some potential for Web-based activities, such as *Name That Zoom*. As the initiative took hold, the originator of the idea began to take more responsibility for the contest by getting her own Twitter account and playing a larger role in the day-to-day operation of the contest.

The *Flickr Plant Project* started a little differently, but had similar results in terms of staff development. The Director of the Butterfly House (a plant expert) came to the DIDE with an Excel file containing photos and information about every plant in the collection. The DIDE worked with him to brainstorm the idea of putting photos of the MLS plants on Flickr and then seeing if others would contribute their own photos of the same species. As was explained, "That totally happened!" The DIDE assembled the technologies and helped get it started, and then trained a Butterfly House staffer to run the *Plant Project* by uploading photos, tweeting, and responding to others' uploads independently each week.

Over the years, each new Web 2.0 initiative began with a staff member who became its key caretaker. As the ideas kept coming in and the new experiments began, the number of people with their own initiatives kept expanding. For example, the *Plant Project* led to additional

Butterfly House staff getting involved by posting photos of butterflies and moths to the Flickr *Butterfly Keeper* collection. The DIDE tried to make each experiment easy to maintain because, as more initiatives were added, the capacity of the original core group to develop new experiments and manage existing ones was exceeded—they "needed to spread the work around." The result was that more and more staff members became comfortable with and knowledgeable about what had once seemed like unfamiliar and perhaps somewhat daunting Web 2.0 technologies. Of course, this approach to staff development worked best for staff members who had specific projects that lent themselves well to Web 2.0 tools.

It was clear that having an idea and taking on a new initiative was one way to become part of the MLS community of Web 2.0 practice. But there were other ways that drew staff members even closer to the core group. These additional approaches were often more than just job related; they tended to assimilate Web 2.0 into staff members' lives, both in and out of the workplace, in a number of ways. For instance, more and more MLS staff members began purchasing their own smart phones using their own money. (One staffer said he gave up cable television so he could afford his new phone.) With a new tool to access the Web, these staff members began to incorporate more Web 2.0 applications into their daily lives. For instance, staff saw how the DIDE was using Twitter for both work and play and realized there was some value in that for them as well. More staff members began using Twitter as part of their personal lives, not just for work at the Museum. At work, staff used smart phones to tweet and send direct messages to set up meetings. Also, the DIDE helped staff members incorporate other sorts of technologies into their lives. One staff member described how the DIDE helped set up her new MacBook, which she began carrying to and from home.

It was also interesting to note that more MLS staff began to communicate and socialize outside of work. For instance, some of the staff in the Division of Innovation and Learning created a book group, which included both MLS staff and others. They read a book a month and posted about it on Facebook and Twitter. Staff who acknowledged they were originally intimidated by computer technologies said their friendships with Web 2.0 savvy staff, including members of the core group, led them to get more involved with Web 2.0 and become more technologically inclined. The next section describes two examples of how the DIDE encouraged those sorts of friendships after Museum hours.

Building Community after Hours

Incorporating Web 2.0 technologies into everyday life was an important component of creating a community of practice. The DIDE developed two major approaches to facilitating this outside of regular work hours and, to a large extent, away from the Museum grounds.

Pinhook

The Pinhook bar is located in downtown Durham,[7] about three miles from the Museum. Shortly after she began work at MLS, the DIDE began holding what she called "office hours" at the Pinhook starting after the Museum closed on Fridays. MLS staff members knew she would be

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[7] The Pinhook website: http://www.thepinhook.com

there at that time, although she also tweeted reminders and posted invitations to special Pinhook events. Although members of the core group were participants in this group from the beginning, all MLS staff members were invited, and new people were encouraged to come.

The DIDE referred to this community as "The Pinhookers." During the period of data collection for this study, MLS staff members who came to Pinhook seemed devoted to their work, and there were indications that they would still talk about work after hours, even without Web 2.0 as a focus for the gatherings. Attendance at the Pinhook ebbed and flowed, increasing when someone set up a 4 p.m. work-related meeting at the bar or when there was a staff member's birthday to celebrate. Some days the group that came to the Pinhook was so large they had to split up to different tables in different areas of the bar. At times, members of the general public also participated, because they had read the DIDE's tweets on her personal Twitter account.

Staff members described Pinhook Fridays as "a happy hour," and said "it's fun to go there and get to interact with colleagues in a different way, even when they are still talking about work." Staff also talked about how the Pinhook experience helped them develop perspectives that led to working more closely with colleagues later, and that conversations that happened at the Pinhook sometimes continued at work the next week.

One interesting strategy at these events was the facilitation of informal collaborative drawing. This "drawing together" was initiated by the DIDE as an informal way to loosen creative boundaries through visualizing ideas.[8]

Although the Web 2.0 discussions at the Pinhook served as an important bonding experience for those who were able to attend, some MLS staffers with an interest in Web technologies never participated. Competing priorities seemed to be one of the biggest deterrents to attendance at the Pinhook, as some staff had to go home to families and other commitments. There were indications that other staff members just didn't like hanging out in bars or didn't want to come to what some regarded as a suspect neighborhood. These staff realized they were missing out on an important bonding experience; even if it seemed like "just chatting and bonding," they recognized that relationship-building was probably the most important thing that went on there, and was the major thing they missed out on.

Experimonth
In January 2009, the DIDE started Experimonth, a project that took place mainly on personal time but that also contributed to the DIDE's work of building community and helping MLS staff become more comfortable with Web technologies. Experimonth [9]was set up so that each month participants did a group experiment that altered their lives in some way, and then they used social media to communicate with others about their experiences. The topic for each month was determined through an open call to the DIDE's online friends and followers (which at this point included some MLS staff members), and then voting on them in December. The top twelve Experimonth suggestions were then implemented, one per month, over the next year.

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[8] See: http://www.flickr.com/photos/10ch/sets/72157623215069820/
[9] See http://experimonth.com .

The choices for 2009 included doing a certain number of push-ups each day, trying to eat only raw foods for the entire month, and taking a picture or writing a haiku each day. Every month participants were encouraged (but not required) to use a different web technology as part of the Experimonth by, for instance, blogging or tweeting about their experiences. Many participants had never blogged or tweeted until they did so as part of a given month's experiment, so the experience increased their technological know-how and web awareness.

Regular participants included most members of the core group, as well as members of the extended community of practice. By the end of the year, it had become more of a social experiment, with those who participated saying it brought them closer together. Data indicated that Experimonth contributed to the development of stronger relationships between the DIDE and the people with whom she worked most closely, facilitated the sharing of ideas, and helped with more effective communication.

One participant described the "raw month" as the coolest Experimonth, in part because she made it all the way through. The haiku month also seemed very successful to her because it was pretty easy to tweet a haiku. Take a Picture a Day was also easy and fun, and "you wanted to stay with it to see what other people would [take pictures of]." One thing that staff appreciated was that "they were all so different."

Other participants also talked about the complex nature of their Experimonth experience—part learning about technology, part building relationships with other staff, part developing the Museum's culture. One said this was partly about the camaraderie, but it was also her first foray into blogging. She said that even if you didn't go through with the whole month of, say, eating raw food, you could still share your experience online. She also said the coolest part for her was that Experimonth was part of developing the Museum's culture of "paying close attention to what you are doing" and then "documenting and sharing" (described below in the section, Shared Authority and Co-Creation of Knowledge).

Originally scheduled for one year, Experimonth was considered a success and continued into 2010.[10] At the time of the writing of this report, plans for incorporating the Experimonth model into museum initiatives were being developed.

Which Staff Were Participating in Web 2.0?

As noted earlier in this report, Museum staff who participated in the Web 2.0 initiatives came from across the Museum (see Appendix G for an unofficial organizational chart depicting staff members who were involved in Web 2.0 initiatives during this research study). For example, *Greg Dodge Journal* was written by a Guest Relations Associate who worked in *BioQuest*, and most contributors to *The Science Education Blog* worked in the Science Education Resource Center; these staff all worked under the Vice President for Administration. The Director of Membership Advancement was an active Twitter user and contributed to the Museum's

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[10] Here's an example of a group blog about the May 2010 Experimonth where participants cooked recipes consisting of five or fewer ingredients: http://fiveorfewer.tumblr.com/

Facebook page. Staff who worked with living exhibits ran the *Animal Department Blog*, *Flickr Plant Project*, and *Butterfly Keeper* photo collection, and they also contributed YouTube videos for *Munch Cam!* Exhibits Development staff incorporated Web 2.0 components into planning new exhibitions, like *Dinosaur Trail* and *Contraptions*, and also became active on Flickr. The Innovation and Learning Division included the Director of Innovation and Digital Engagement (DIDE) and the staffers who ran *Name That Zoom*, Web 2.0 initiatives for *Periodic Tables,* and videos for *Science in the Triangle*.

One surprising finding from this study was that some of the less active participants in Web 2.0 were marketing staff and the educators in School and Family Programs. At some other museums, public relations and marketing staff and educators have taken central positions in developing social media, but that was not how it happened at MLS. Staff suggested various theories about this phenomenon, including staff changes during the initial stages of *Take Two*. They also pointed out that most of the core group and many early members of the Web 2.0 community of practice were relatively recent hires at the Museum and had not worked at MLS during earlier years when the organizational culture was quite different.

Staff members who were already part of the community of Web 2.0 practice talked about how that community was growing. For instance, they cited increasing numbers of staff members who had established Twitter and Facebook accounts and who had begun showing up at the Pinhook after work on Fridays. They also pointed to examples of increased cooperation among divisions, such as during the arrival of Yona the bear,[11] and attempts to alert all concerned parties when an upcoming blog post was going to deal with a potentially disturbing subject, like euthanasia of an animal on public display. They emphasized that Web 2.0 was, at that point in time, spreading from person to person at MLS, and regarded it as mostly a matter of time before the community of practice would infiltrate all departments.

These same staff also cited certain Web 2.0 practices they were committed to keeping as they expanded the community of practice. For instance, they wanted to maintain the levels of transparency, open sharing of experiences, and "freedom to fail" that they saw as characterizing the first few years of Web 2.0 at MLS. They also said they wanted to maintain a strong focus on engagement and learning with their social media audiences, with marketing and fund-raising considerations playing a secondary role.

Professional/Personal Crossover

One interesting and unanticipated finding that emerged during the course of this study was the role of Web 2.0 in the blurring of professional and personal lives. While not a primary focus of investigation,[12] in some cases it was impossible to tell when one ended and the other began. As is typical in many museums and other non-profits, this crossover appeared to pre-date the development of any Web 2.0 culture at the Museum. As one respondent explained, "The Museum has always followed me home." Another respondent said her work often came home

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[11] Read about Yona's arrival on the *Animal Department Blog*: http://blogs.ncmls.org/keepers/2010/01/15/yonas-here/
[12] This study focused on the development of Web 2.0 culture at MLS, not in respondents' personal lives.

with her, both because of the nature of the job and because of who she is. She gave the example of a shopping errand she did for the Museum while out with her child. These staff seemed to consider the overlap between their work and personal lives to be just another part of their jobs.

With the integration of Web 2.0 technologies and a Web 2.0 way of doing business, it was only to be expected that the crossover between professional and personal lives would extend into this new realm, and there were data to support this, although no MLS respondents indicated that this created an increased burden or challenge.

Some respondents saw advantages to the ways that technology helped them accomplish all they needed to do as part of their jobs. Staff members who often worked at home during Museum hours described that as a benefit of the type of job they hold at the Museum. Staff who took work home at night described how new tools they could use at work or home, like laptops and smart phones, had increased their productivity by helping them use their time more efficiently. They said it was nice to finish work at home so they would not have to stay late at the Museum. That said, some staff noted that the fact that they could "work on everything at home is kind of bad in a way." For instance, if they checked work e-mail at home, they could "get sucked into other aspects of the work."

There were indications that, on balance, many staff members felt that using mobile technologies at home did not take time away from other aspects of their lives. Owning a smart phone, for instance, let them do e-mail more easily. Staffers said this didn't take more personal time, because they didn't waste time starting up their computers. Also, once the technology was integrated into their lives, it didn't take extra time because they were using it as they did other things. The data indicated that the professional/personal crossover at MLS—both prior to and after the development of a Web 2.0 culture—was typical of most museums and that the Web 2.0 culture per se did not create any additional professional/personal crossover challenges or difficulties.

As discussed in an earlier section of the report, two of the primary ways in which the Director of Innovation and Digital Engagement (DIDE) contributed to the development of a Web 2.0 community of practice—Pinhook gatherings and Experimonth—took place largely after Museum hours. Staff spoke of the Pinhook experience as one of the areas where their professional and personal lives blurred together. However, they also pointed out that socializing with their colleagues was nothing new for them. Experimonth, however, was something new in staff members' lives. Perhaps because Experimonth activities were voluntary and enjoyable, and there was no penalty for dropping out, researchers heard no complaints from participants that this seemed like an intrusion of work into leisure time. However, this issue was not investigated in any depth with non-participants.

Staff also discussed how lives sometimes overlapped the other way, i.e., personal into the workplace, and this was "not all for the good." Some noted cases where other staff had used their phones to post personal tweets or take personal cell phone calls while on the job. Staff noted that using mobile phones "removes you from the present," which can become a problem when your work requires you to be "focused on the here and now." Respondents also explained that they sometimes used their mobile phones to do "personal stuff" at the Museum, in part justifying this

by pointing out how often they did "work stuff" at home. There were also indications that there might be a bit of tension between front-of-house staff, who were not allowed to use mobile devices on the floor, and staff in other divisions, who were more-or-less encouraged to incorporate mobile devices into their work lives.

As one staff member put it, the way the online world seems to be moving, peoples' lives are increasingly "always on a stage," and the question was whether or not people would embrace this new world. Many MLS staff who posted on Twitter and on blogs appeared to do so. This included posting their names and photos and inviting the public to get to know them. For instance, visitors were encouraged to approach Greg Dodge as he patrolled the Museum grounds and talk to him about what he was finding. Also, when animal keepers talked to the public, they often handed out small cards with the address of the *Animal Department Blog*. There was no evidence of negative consequences of these approaches, and no respondent complained about their privacy being lost, but it is important to keep in mind that Web 2.0 at MLS was, at the time of this report, a work in progress.

FINDINGS: Shared Authority and Co-Creation of Knowledge

Two major themes investigated as part of this study were the sharing of authority that was part of Web 2.0, and the idea that integrating the use of Web 2.0 applications into the Museum can lead to co-creation of knowledge among museum staff and visitors. These two themes played out and interrelated in some interesting ways at the Museum of Life and Science, as discussed in this section of the report.

Shared Authority

Many museums have traditionally been thought of as repositories of knowledge, with the public generally accepting and embracing an institution's authority over the objects and accompanying interpretations presented within its walls. The integration of Web 2.0 technologies has the ability to shake up notions of institutional authority. This study was particularly interested in seeing how the issue of shared authority evolved over time, and whether and to what extent it presented benefits and/or challenges to the institution.

During the course of this two-year study, researchers observed many MLS staff members participate in the development of a culture of observation, documentation, and sharing at the Museum. Both staff and visitors were encouraged to be part of this culture; staff contributed to it as they carried out their jobs, and visitors contributed throughout and following their visits, using a variety of mobile technologies. This approach acknowledged and even celebrated the fact that a wide range of people—staff and non-staff—had the power and authority to speak for and about the Museum of Life and Science and its collections. It should be pointed out as well that observation, documentation, and sharing are core ways to use "science as a way of knowing," which was a central idea in the Museum's mission.

Sharing authority with staff
As discussed earlier, increasing numbers of staff purchased and were using smart phones of their own accord and with their own funds. They were using them to interact with both other staff and the Museum's audience using platforms like Twitter, Flickr, and Facebook. The culture that was emerging around these shared experiences was shaped, in part, by MLS leadership's philosophy of what was possible in terms of participation at the Museum. There were indications that these leaders valued the fact that staff were creating content on their own, outside of normal Museum channels. This creation of content was done with the blessing of the Museum's leadership, even though the range of voices broadcasting under the Museum's name went far beyond what some staff termed the "official curatorial voice that historically museums have fought to protect." MLS leadership had "taken the lid off of that," telling staff that, if they wanted to create, they could. And they did. It was clear that staff members were sharing with each other and with visitors, creating a culture of sharing that at least some Museum visitors seemed to respond to positively.

Staff members who created content using non-digital media were also incorporating Web 2.0 into their work. One example was an exhibit developer who was working on a math exhibit about scale, building a sequence of chairs that increased in size by a factor of two. On his own initiative, he documented each step with a digital camera and posted the photos online. As one

staff member said, "It's like: 'My stuff will see the light of day; people will care.'" Additional examples of this sort of photo documentation were posted on the Exhibits Department Flickr pages.

As one Museum leader said, "Great ideas come from anywhere." But Museum leaders were also aware that that did not mean everyone was comfortable with shared authority. As one leader noted, "That was not the way I was raised in the business world, say, twenty years ago." Back then, he explained, most staff would never have had permission to publish to the world. By giving staff permission to do so, this staff member said that all he was trying to do was embrace reality. "In a Web 2.0 world, staff can easily publish their thoughts for the world to see." If something was going to be said—for example, if staff were frustrated—he would rather have it said in plain view so he could respond to it. "They would have said it anyway under their breath or quietly, but that doesn't mean it would not have had as big an effect as it does now." So he said, "Let's go for it, and let's see what happens."

This openness extended to subjects that might make some visitors and staff members feel sad or uncomfortable. For instance, the *Animal Department Blog* sometimes dealt with sensitive topics, like euthanizing an animal. When they did so, they tried to be honest, and yet sensitive. Staff said that was part of why they started the blog, so they could talk about the range of topics that were integral to their work. There were, however, some limits. While in person, Animal Department staff might be jokey and sarcastic, they tried to be more sensitive while writing a blog post. Although the blog's supervisor met with new bloggers to talk about mission and audience, other than that, the keepers who were writing the blog were trusted to do so in appropriate ways.

Recognizing audience's authority

While establishing the staff's authority to communicate about their work was a top-down decision, it took a different process to help staff recognize that visitors already had all the authority they needed to shape other people's perceptions of the Museum using Web 2.0 tools. In other words, visitors were already describing their experiences and sharing feelings about their visits to the Museum on their own blogs, Twitter and Flickr accounts, and Facebook pages. Embracing a Museum-wide Web 2.0 culture, however, meant that there were opportunities to incorporate these visitor experiences in a more deliberate way. Using special search algorithms, the Director of Innovation and Digital Engagement (DIDE) started finding out what visitors were saying about the Museum, and then took the bold step of posting links to selected blog posts from the Museum's homepage (Fig. F-2). Many of the posts were positive about the Museum, but some were not, and the negative blog comments made some Museum staff a bit uncomfortable. MLS staff slowly came to recognize that visitors already had shared authority over the Museum's name.

Posting visitors' online comments about the Museum on the home page seemed like "an enormous shift." This was referred to by one staff member as "realism, and benevolent re-use." But there was risk involved because this was re-use without permission. As of the writing of this report, there were no complaints from the bloggers, perhaps because, as one staff member put it, MLS can "bask in this glow of good[will]." On the other hand, one blogger emailed the Museum because she was disappointed that her post was *not* on the home page. There was also concern among staff members that, even when blog posts were selected carefully, these links could be a

click away from offensive language or pornography. Finally, if a visitor's blog post had a particularly personal feel to it, it would not be included.

In one clear example of shared authority, a theft of the brontosaurus head from the old *Dinosaur Trail* exhibit provided an object lesson in the power of visitors' authority. In late spring 2009, someone stole the head from the Museum's iconic dinosaur model, on display since 1967.[13] An informal group of Museum supporters "instantly banded together and built a website, had meetings, and took action." This impromptu visitor posse eventually discovered who stole the head, using a process that some described as "close to vigilante action." Staff presented this as an example of visitors taking ownership of an aspect of the Museum that was important to them, and demonstrated how some visitors were willing to appropriate whatever authority they needed to step in and solve the crime.

Another example of shared authority at MLS—and the challenges of sharing this authority—was as follows. A member of the public, someone who visited the museum frequently with his children, created a Flickr group called "North Carolina Museum of Life and Science." The founding of this group pre-dated the hiring of the Director of Innovation and Digital Engagement (DIDE) and the creation of the Museum's own Flickr group. As explained by an MLS respondent, "[The founder of the NCMLS group] was a professional photographer and would search Twitter for photos that folks took of the Museum, and invite them to the group. [The] problem was that his personal Flickr account was full of nude shots (some of which were bordering on pornographic). Because he created the [NCMLS] group, those [nude] shots were always one click away." Furthermore, "there wasn't any way to tell this [NCMLS group] apart from our own Flickr group."
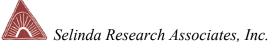
The situation ended up resolving itself. It turned out that the user eventually made his photos private "because people were 'stealing' them on Flickr." When the Museum contacted him to discuss the situation, he stressed, "If my involvement as founder of the NCMLS Flickr group is causing problems for the Museum, that's the last thing I want. Our family loves the Museum and it is an important part of our lives." He explained that his intent was "to give voice to other friends of the Museum who have great photographs taken [at MLS] but no place to share them," and suggested that he "hand the reins over to a less controversial custodian." He then turned the Flickr site over to MLS to administer.

Co-Creation of Knowledge

As noted above, visitors were creating and sharing social media posts related to the Museum independent of the existence of the Museum's *Take Two* project. This section discusses initiatives where the Museum encouraged visitors' efforts by deliberately supplying the physical and digital tools they needed to construct and share their creations, intellectual and otherwise.

Museum leadership described co-creation as a "big area of experimentation" for the Museum, and said they would be "investing in this intellectually, and then financially." A commonly cited

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[13] Go here for more information about the theft:
http://www.facebook.com/posted.php?id=120832601116#!/group.php?gid=120832601116

example of co-creation was the *Contraptions* exhibition, where many different types of co-creation took place. One kind of co-creation was when visitors to *Contraptions* left pieces of machines behind for other visitors to discover and either appropriate for their own use or be inspired with ideas they could build on. The Museum took this a step further by encouraging visitors to video their creations in action, and then post the results on YouTube. When other visitors viewed these videos in the exhibition, they experienced a more complete but asynchronous and digital version of the "left behind" pieces that sometimes littered the exhibition. At the time of this writing, more than one hundred *Contraptions* videos had been made by visitors of machines they created and were proud of. (See Appendix D for more information about the *Contraptions* exhibition and Appendix E for a link to view some of these videos.)

One example of visitors' creations influencing other visitors' experiences was a contraption that spiraled balls into a bucket. A video of this contraption in operation was posted on the kiosk in the exhibition. Shared with other visitors, the video both inspired them and raised the bar on what could be done within the exhibition. Visitors were encouraged to upload their videos even if their contraption didn't work, and then try again. This was both because other visitors could learn from their mistakes and because, if a visitor had a hypothesis about what type of contraption was likely to be successful or how often first attempts failed, then they could use the full range of videos available to them to test their own ideas.

It turns out that a significant challenge with the *Contraptions* exhibition was getting permission to post visitors' videos on the Museum's YouTube page. As one staff member described it, this issue was "not high on their radar early on" as *Contraptions* was being developed, but once they got past the soft opening of the exhibition they realized this was something they needed to address. Exhibits staff added a permission statement to the video uploading program, which gave MLS permission to use the videos. Staff efforts then turned to what to do about visitors who may have wandered into the background of a posted video. At the time of this writing, the Museum was still exploring different options for how to handle this issue.

Museum staff brainstormed ways to extend the kind of co-creation experienced in the *Contraptions* exhibition into the online world by allowing people to share other kinds of "leave-behinds" using digital media. One leader joked that he wanted MLS to be "the eBay of learning experiences," where the buyers (visitors) and sellers (also visitors) would do most of the work (inspiring and teaching each other), and the Museum would just connect them. He explained, "That's an aspiration right now, but it seems like a fair one."

The co-creation of entire exhibits with Museum members was described as "an aspirational goal for the Museum." Some staff explained they wanted to go beyond just getting visitor feedback during prototyping, and start including visitor feedback throughout the entire design/development process. One leader portrayed the co-creation of entire exhibits as a "big challenge for science museums in general," especially for underrepresented audiences and non-dominant groups.

Another instance of co-creation, begun in spring 2010, encouraged visitors to use their smart phones to document their Museum experiences and share them with each other and Museum

staff. The starting point was the idea that keepers made observations about animals as part of their jobs, so perhaps visitors could use their mobile devices to submit their own observations about the animals at MLS. In this experiment, visitors used Twitter to submit their observations of Yona the black bear on display at the Museum, marking them with the hashtag "#yona" so that MLS staff could search them out on Twitter. One challenge was to find a way to display other visitors' tweets as inspiration for observation and sharing (particularly difficult in an outdoor setting). This experiment had an element of doing real work, and it was more like citizen science than some other things MLS had done.[14] It also seemed like a kind of visitor-staff co-creation, because the two groups worked together to better understand the behaviors of the Museum's animals.

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[14] During May 2010, searching for "#yona" on Twitter turned up several visitor tweets about the bear, although it turned out that the #yona tag was also being used for other purposes.

FINDINGS: JUDGING SUCCESS

The data indicated that MLS staff used a range of criteria to judge the success of individual Web 2.0 initiatives. Individual staff members did not use all the criteria listed below to judge their own efforts, but most used at least a few of them in their work.

Criteria for Success

Numbers served

The most commonly used criterion seemed to be, "Are people using it?" In most cases, this was relatively easy to measure, and the Director of Innovation and Digital Engagement (DIDE) took on the role of extensively documenting and reporting use in a variety of formats. She posted quite a few analyses of usage statistics on her *useum* blog and elsewhere.[15]

For example, the YouTube video component of *Contraptions* was getting what staff members considered to be lots of use. Exhibits staff were building a large database of videos that were posted online and that could be used in the exhibition; for example, on a busy Saturday, as many as twenty quality videos could be produced by the end of the day. In addition, the YouTube website posted numbers of views for each video,[16] and there were additional indications that visitors were using the videos on the Museum floor.

On the other hand, the new initiative that encouraged visitors to record and share their observations of Yona the bear on Twitter was very slow to start. Another initiative that had not gained much use was an option in *Contraptions* to call or text in suggestions for additional materials that could be added to the exhibition.
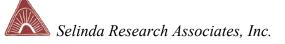
Low numbers alone did not necessarily imply to staff that a given experiment had failed, as long as the people who participated made it evident that they were thinking about science. In general, Museum staff did not seem to feel that low usage alone was a reason to discontinue an experiment. They considered several other criteria before making that decision.

Audiences served

This next set of criteria for success was complex but closely related to the Museum's mission. Looking at *who* was being served by a Web 2.0 experiment was also an important criterion. Respondents cited variables like ages served, whether users were Museum members, and whether online users were also visiting the physical Museum.

As mentioned previously, adults made up an important audience segment for MLS. One of the most important criteria in judging success appeared to be whether a Web 2.0 experiment was

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[15] Here are two examples of the DIDE's usage statistics to describe: (1) participation in *Name That Zoom*: http://useum.tumblr.com/post/393188494/view-larger-weve-been-playing-a-combo ; and (2) the range of projects from the first year of *Take Two*: http://useum.tumblr.com/post/113931651/museum-of-life-and-science-state-of-the-web-a

[16] As of April 2010, videos had been viewed as many as 50 times.

attracting and holding an adult audience. Adults, in this context, could be parents or non-parents, as long as they were participating for themselves, not for their children or grandchildren. Because it was difficult to attract child-free adults to the Museum, staff were quite pleased that their Web 2.0 experiments seemed to be reaching an adult audience. For instance, looking at Twitter profiles, staff discovered that *Name That Zoom* (described above) was played mostly by adults. As one staff member told us, the Museum was trying to facilitate in the adult community a feeling that Web 2.0 experiments were intentionally for them, not for families with young children. That was one reason why the Museum sponsored an adults-only *Name That Zoom* event in *Contraptions* (see Appendix D).

As discussed earlier in this report, Museum members were also a major focus of the Museum's overall strategy, considered by leadership the most apt to be successful learners, given their frequent visits to the Museum. However, with regard to Web 2.0 experiments, the data indicated that Museum members as a group did not make a particularly large contribution. As one Museum leader described it, Museum members were considered an "aspirational community" at best.

This was not for want of effort. For instance, the *Animal Department Blog* and *Greg Dodge Journal* were initially considered ways to increase members' emotional connections to the Museum and to, in theory, help with renewals. Although Museum membership was growing, the blogs did not seem to be playing a large role in most members' lives. Some of the people who participated in Science Cafes and on Twitter were Museum members, but the majority of users were not. That said, there were some Museum members who were very active online. Online champions of the Museum sometimes emerged from the member community, and these enthusiasts sometimes shared their experiences at the Museum with their social media followers as frequently as once a week or more. Members who were active online included people who had posted a *Name That Zoom* of their own, and folks who tweeted about Yona the bear. That said, Museum leaders did not seem worried that most of the online users were not members, "We don't need to solve that yet."

Researchers also talked with MLS staff about whether there was overlap between their online communities and the folks who actually visited the Museum, and whether that was important to them. While staff agreed that this was important to them, assessing it proved more difficult. The DIDE tried to determine the amount of overlap by analyzing the usage statistics, but the initial findings turned out to be confusing. There was evidence that most of the MLS Twitter followers were local and thus potential visitors to the Museum. Also, there seemed to be some overlap between regular users of the *Investigate Health Lab* and online visitors, but these were mostly visitors who went online to get the *Lab* activity schedule off the Museum's website. Staff members were working on a new public website for the Lab that they hoped would facilitate more overlap. At the time of this writing, they were testing lots of new ideas to see which might work. For instance, in one experiment, *Lab* visitors were able to interact online with a digital science notebook and reflect on what they did in the *Lab*. This website had not gone public as of May 2010.

In summary, the ability of Web 2.0 experiments to attract adult audiences of lifelong learners was considered a major success for *Take Two* at the Museum of Life and Science. Other

potential online communities, including members and visitors to the physical Museum, were not as fully realized.

Engagement and Participation

Several staff talked about encouraging online engagement and participation as a criterion for successful MLS Web 2.0 experiments. An example of this is the following list of goals for social participation from the *useum* blog:[17]

> **Gives a sense of place.** Connects user to the physical space of the Museum, perhaps even redefines what the Museum's space is for that person.
>
> **Educates.** Teaches the user something they didn't know (or didn't realize they knew) before. Could be about themselves, their world, or the Museum itself.
>
> **Encourages sharing.** Incites the user to share (thoughts, media, etc.) either with the Museum or with their friends on behalf of the Museum.
>
> **Builds a relationship.** Provides a way for the user to know the Museum or another user better through participation/interaction.
>
> **Fosters dialogue.** Creates, establishes, or otherwise encourages commentary and the back-and-forth of ideas and opinions. Can be synchronous or asynchronous.
>
> **Establishes transparency.** Gives user an intimate view of the inner workings/strategies of the Museum.
>
> **Science as a way of knowing.** Encourages curiosity and highlights science as a way to satisfy it. Demystifies the traditional assumptions people make about science.

The Director of Innovation and Digital Engagement (DIDE) developed a social participation heuristic that MLS staff could use to evaluate their own Web 2.0 projects, and this approach was highlighted in Nina Simon's online book, *The Participatory Museum*.[18] However, at the time of this study's spring 2010 data collection, the social participation tool had not been widely used by MLS staff.

Learning outcomes for those who participate

Evidence of "learning, pre-learning, [and] social learning" was also cited as a criterion of success by Museum staff members, and was reflected in the DIDE's social participation goals, listed above. However, most Web 2.0 experiments did not appear to have specific learning objectives, at least during the initial stages of *Take Two* development, and there were no formal efforts to evaluate what sorts of learning were taking place among online users.

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[17] This post can be found here:
http://useum.tumblr.com/post/85903060/measuring-social-participation-in-a-science-museum
[18] The goals and evaluation tool are discussed in Chapter 10: "Evaluating Participatory Projects"
http://www.participatorymuseum.org/chapter10/

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Impact on staff time
Some *Take Two* experiments required much more staff time and facilitation than others, and one criterion for success was whether the time investment was worth the return. For instance, the *Flickr Plant Project* only required posting and labeling a photo, then asking followers if they had photos of something similar that they could share. On the other hand, *Name That Zoom* was an interactive, time-limited game on Twitter that required more intense facilitation by the staff member who ran it. Writing, photographing, and making videos for blog posts (such as the *Animal Department Blog*) took even more time. Although staff considered that time to be well spent if the experiment led to higher levels of user engagement and participation, impact on staff time was still a criterion to be considered when judging an experiment's success.

Building staff competence and developing models
As was mentioned previously, Museum staff had a wide range of comfort level with, knowledge about, and prior experience with Web 2.0 technologies. Many of the staff activities both at work (like DIDE presentations at staff meetings) and after work (like Experimonths) were designed to build competence and develop models for what the Museum wanted to achieve online and beyond. Staff members indicated that even when a particular experiment failed to satisfy many of the criteria described above, it might still be judged successful if it contributed in meaningful ways to on-going staff professional development.

Deciding What to Continue, Change, Add

As of spring 2010, little formal evaluation of individual Web 2.0 initiatives at MLS had been conducted. That said, during the time of this study MLS staff regularly reviewed what they were doing and sometimes dropped things that proved unsuccessful. Usage statistics were gathered and shared in staff meetings and online. Staff also held informal one-on-one discussions with the Director of Innovation and Digital Engagement (DIDE) and thought deeply about the experiments they were involved with. But when it came time to decide how to proceed with any individual project—whether to continue it, modify its direction, expand it, or fold—the decision was made informally in a process led by the DIDE and involving the most immediate stakeholders, along with the Vice President for Innovation and Learning (VPIL).

MLS leadership said they were, for the most part, "more than satisfied" with the Museum's progress with Web 2.0, that they were "delighted with the extent to which things are being used," and were also "happy that the initiative gave voice to those [staff members] who felt they didn't have one."

However, data indicated that a number of lessons had been learned over the course of the project. MLS staff shared numerous ideas for changing certain aspects of *Take Two*. These are discussed in the following sections of the report.

FINDINGS: FUTURE PLANS

Short-Term Web 2.0 Plans

Study data indicated that planning related to *Take Two* was constant and rather informal in nature. When MLS staff had an idea, it could move from the discussion phase to online experimentation pretty quickly, sometimes in a matter of days or weeks. Because the Museum used readily available media platforms for most of its Web 2.0 efforts, the major impediment to moving forward on a project was staff time, rather than funding to contract with someone to write an entirely new computer program.

Although Museum staff were mostly focused on the experiments that were in progress (like visitors tweeting about Yona the bear, and a new website for the *Investigating Health Lab*), they also discussed other short-term plans. For instance, with future exhibits, staff said they planned to "do a better job of documenting, being transparent about what they are doing, and sharing widely." Exhibits staff wanted to be more inclusive, for example, by having visitors and others see and even comment on undeveloped ideas. That was already happening to some extent on the Exhibits Department's Flickr pages. As one staffer put it, "The bar has been lowered on sharing, including just random pictures, to see what people say."

Staff were also concerned about the effectiveness of their current Facebook strategy and were thinking about potential changes to it. Previously they had been acting as if their Facebook fans checked their accounts infrequently. They posted only once a week or so because they didn't want to "overload people with posts and have them regret subscribing." Since many of the Museum's followers had begun checking their accounts at least once a day, staff planned to increase posts to a couple of times per week. They talked about sharing more science links and photos and "not worrying about over-posting." Also, the Director for Membership Advancement was scheduled to take over as the primary voice on Facebook. Staff were also considering trying some paid ads for Facebook users, which could be targeted very specifically to people's interests and place of residence.

Another short-term goal for members of the core group was to share their Web 2.0 experiences more widely with the museum field, to "find ways to open-source all this work, making it available to other centers." Museum leadership said they wanted to invest more of the Director of Innovation and Digital Engagement's time in teaching about the Museum of Life and Science model for those who would like to adopt some or all of it. The DIDE (Director of Innovation and Digital Engagement) was already doing some of this, through posting things through Delicious and on her *useum* blog, going to conferences like WebWise 2010 (sponsored by the Institute of Museum and Library Services), posting her SlideShare presentations, and writing a chapter for a new *Twitter for Museums* book (Landon, Wallis, & Davies, 2010). The DIDE was planning to do even more of this towards the end of the *Take Two* project.

Longer-Term Web 2.0 Plans

As noted earlier, the approach to digital media at MLS allowed lots of room for rapid development of new experiments. That was important because longer-range planning for Web

2.0 and social media was a challenge, in part because any ideas worked into a mid- or long-range plan had to be platform independent, "ideas have to work on whatever the new thing is." That meant that the Exhibits Division could plan a new exhibition three years out, but they could not plan the specifics of interactive engagement until closer to the exhibition's opening.

This presented a challenge when trying to develop and publicize things like five-year plans, or writing a proposal to obtain grant funding for new projects. As staff pointed out, "tech is generative four to six months," but grants for mobile technologies were at least a year out—and the hardware and software that far out were "completely unknown to us today." The MLS funding process asked grant applicants to outline in some detail what they were planning to do. However, "after you submit your idea and get money, your thinking has evolved and it looks a little different." As one staffer put it, "Funding tech is not like funding a set of chemistry proposals." This problem was compounded when there was only one chance a year to apply for funding.

Grant funding will be critical for the continuing development of Web 2.0 at MLS. In part, that is because the *Take Two* grant matched about half of the DIDE position's salary. Museum leaders explained they felt the case for funding was going to be easier to make because *Take Two* had allowed them to build a "proof of concept" for their approach to Web 2.0. Despite the challenges, staff had written and submitted grants that would allow them to pursue ideas that were "bigger or different" than what they were currently doing. As one staff member said, "The next steps are built on a solid platform where [we] can investigate some important questions with implications for the whole [informal science education] field." If these grants are not awarded, Museum leadership said they were committed to finding other ways to continue the work, perhaps with operating funds.

Beyond grant funding, technology trends also played a role as staff developed future plans. For instance, a Museum leader had bought an iPad to "fool around with, because familiarity with it is important; it changes the way you think." Staff claimed that, when it came to technology, the science museum field was "woefully behind the rest of the world." They described science museum technology as "antiquated when it hits the floor; it's way behind the times. That's why an Apple Store can be more fun to go to." Although the MLS approach to rapid Web development helped keep online initiatives closer to the cutting edge, technology-dependent exhibitions faced a much greater challenge.

Future Staffing

The consensus at MLS was that the key to succeeding at Web 2.0 was to "hire talented and energetic people and see what they do." That idea was put to the test as this report was being written, as Museum managers were hiring new staff members in both the Exhibits and Animal departments, where two of the most active bloggers and strongest tech people were leaving.

MLS managers said that Web 2.0 was an important thing that they took into account when hiring new staff. Part of what they had been looking for was technology expertise—for instance, a new hire in Exhibits had "multimedia, podcasting, and web design experience, which is a big plus." Other managers who were hiring new staff members were finding applicants who had experience

as users of social media like Facebook, but they said they were looking for something more. As one leader said, "It's more about a desire to participate that's important. Are they interested, fearful? Do they have an adventurous spirit?" The Museum needs "to have people in the same mindset about this sort of thing."

That said, managers were "not hiring bloggers," but rather looking for staff members who could do their core jobs well, and additionally provide a balance of other skills within their departments. For example, in the Animal Department, blogging was considered important but, "like Maslow, you have to take care of other needs first." In other words, keepers would be hired first for their desire and ability to care for live animals, and then secondly for additional skills they would bring to round out their department—skills such as blogging, mechanical maintenance, talking to guests, and/or organizing things.

In addition, Museum leaders were well aware of the central role that the DIDE position played in this process of developing a Web 2.0 culture at MLS. At what point is a new culture truly established in an organization, compared to when it is integrally connected with a specific individual? What evidence was there that the MLS philosophies of sharing, openness, and experimentation were part of the organizational culture, and what would happen if leadership at the Museum changed significantly? As one staffer put it, employees "hire on for a leader as much as for an institution." If it came down to it, if a new leader instituted a new philosophy— one that was less open and less experimental—would MLS staff lose their permission to fail?

It could not be determined to what extent the Museum of Life and Science model for Web 2.0 depended on personalities, because the critical experiment of removing Museum leaders or key staff from the core group had not happened. As noted earlier, *Take Two* was—and continues to be—a work in progress. The story of Web 2.0 at the Museum of Life and Science is not yet over.

LESSONS LEARNED AND CONCLUDING THOUGHTS

At the start of this research study, Web 2.0 was an experiment just beginning. Two years later, the experiment seemed to be less of a question, and more of a way of life. While the story is not over yet, by the end of this research project, there appeared to be an increased level of institutional comfort with and embracement of Web 2.0, not just as a way of doing business, but as an integral part of the museum's culture. Blogging, tweeting, posting, sharing, and co-creating became part of many staff members' daily lives. Sharing authority with the museums' publics, and co-creating content alongside them moved closer to becoming a natural way of doing business. A few key ingredients appeared to be particularly influential in this positive outcome.

The Director of Innovation and Digital Engagement Position
As with many effective projects, an important key to the success of Web 2.0 at MLS was having a strong leader, in this case, the Director of Innovation and Digital Engagement (DIDE). The project grant provided significant funding for this position, which proved to be a vital role in the process.

While the tendency in technology-related projects is to hire someone whose primary focus is technology, MLS management sought someone who was Web savvy, but who also would be a good leader, someone who was passionate about the project, and who was comfortable with experimentation and risk. One Museum respondent encouraged others who might be considering integrating Web 2.0 into their museum to ask themselves who they have on staff with "leadership potential and passion, [someone who is] just waiting for permission to take risks." The leadership provided by the DIDE was seen by many respondents as critical to the success of the project. As one staff member put it, the people in charge have to be "leaders, not managers."

Innovation and learning
In the case of *Take Two*, it appeared that ensuring that the DIDE had a background in museums or science was not as important as other factors. It mattered, for example, that the position was in the Division of Innovation and Learning, and that both innovation and learning were major functions of the position. Unlike many institutions that embrace Web 2.0 technologies, at MLS the position in charge of Web 2.0 was located outside of public relations and marketing, thereby reinforcing the institution's commitment to innovation and learning. It turned out that many of the initiatives undertaken contributed to (and were perhaps also influenced by) public relations and marketing, and the DIDE maintained close communication with the Director of Marketing, meeting with him on a regular basis throughout the project. But keeping the focus on innovation and learning, key concepts central to the Museum's mission, was an important component in the success of developing a Web 2.0 culture.

A culture of experimentation and risk
Another important component of Web 2.0 at MLS was an institutional commitment to support and value experimentation, and to tolerate a certain amount of risk. As one respondent explained, museum leaders have to ask themselves, "What is your risk tolerance, and will you allow people to follow through on their ideas and not punish them when they fail?" At MLS, upper management made a deliberate decision to accept that a certain amount of failures were going to take place, and that that was going to be okay. MLS staff advocated for a "flood the market"

theory: try lots of things, experiment to see what works. As one respondent put it, "Don't be afraid to make mistakes; it's the only way you'll learn."

Listening
Many museums around the world embrace Web 2.0 technologies as a way to be heard and to get their message out to the public. One of the refreshing aspects of the MLS model was that it turned this thinking on its head. At MLS, Web 2.0 was seen as "not really there for fund-raising or getting the message out—it's not a revenue stream." As one staff member described it, it was "more about listening and giving voice to others, rather than using your own voice." MLS staff recommended listening, experimenting, figuring out where visitors and users are, and then "going to them," using platforms they are already familiar with. Web 2.0 was also depicted as a way of gaining insight into museum audiences, especially concerning what they are looking for in museum experiences. "If you know that, you can develop better programs."

Using existing applications
Another critical part of the MLS Web 2.0 model was the reliance on free, readily available social media and other digital applications, like Facebook, Twitter, Flickr, Delicious, Yammer, etc. Because these already existed, time that would otherwise have been spent by the DIDE and other MLS staff in the development of new products was freed up to explore innovative and creative uses of existing technology. Using existing applications also meant that many users (both public and MLS staff) were already familiar with the platform so there was a quicker learning curve and ultimately more efficient adoption. This familiarity with existing applications also facilitated shared authority and the co-creation of content and knowledge. In other words, it was important to "not build applications from scratch, but to see what's out there already and use that."

Technical Support
When their regular jobs were already packed with things to do, staff sometimes felt "drastically overwhelmed" by even small technological glitches and with having to learn new (to them) technologies. In addition, limitations of older hardware often (as is typical in many non-profit settings) strained the employees' work lives. Having adequate tech support and someone to go to within the organization was an important component of Web 2.0 at MLS. Respondents stressed that before undertaking a Web 2.0 project, it is essential to ask some basic but important questions:
- Does basic tech support exist within the organization?
- Why do you want to undertake the initiative, and is the initiative consistent with the goals of the institution?
- What concerns do staff members have?
- What kind of time is available to plan and then implement the initiative?

Focus on adult visitors
MLS decided early on to shift the focus of the *Take Two* project away from technology and onto concepts such as innovation, life-long learning, shared authority, and co-creation. In other words, the technology became a means to an end, not an end in and of itself. In concert with this philosophy, an emphasis was put on adult visitors in particular. One of the reasons this strategy worked may be in part due to the fact that the museum already had a strong relationship with its family visitors and younger audiences. But it also likely worked because social media appears to

be a platform used mostly by adults. Adults uploading photographs of their children at the museum, adults writing blog posts about their museum experiences, adults contributing to the Museum's Flickr Plant Project, adults regularly reading (and sometimes commenting) on the *Animal Department Blog*.

One of the reasons that online applications like Twitter and Flickr were useful to MLS was because so many adults were already using them. And adult programming worked better when it was designed and promoted specifically for adults—and when there were no children in the Museum (which meant many adult programs took place after regular Museum hours). Adults seemed to behave differently in these settings when children were absent—new roles opened up to them. For instance, a program called *Science of Wine* seemed to engage adults well; they were doing the activities for that program, rather than hanging back as they often did in the Museum's child-packed exhibits.

Institution-wide support and commitment
While change within an institution is sometimes difficult to achieve, one contributing factor at MLS appeared to be that there was a wide range of participation and commitment throughout the organization. While the initial idea for a Web 2.0 culture came from upper management, the implementation of that idea came at all levels and in many ways, from an evolving institutional structure (it was noteworthy that during the initial site visit to MLS no one could put their hands on an organizational chart), to the creation of the VPIL (Vice President for Innovation and Learning) and DIDE positions, to the embrace of a philosophy of experimentation and risk-taking, to the empowerment of individuals at all levels to participate in the process, to the creation of a range of opportunities to engage with—and even own—different pieces of the project. Although not all staff members and volunteers, and in fact not even a majority, readily embraced the cultural shift, there were plenty of ways early- and mid-adopters found ways to participate, whether it was hi-tech, lo-tech, or even no-tech (such as Pinhook gatherings and *Periodic Tables*). It was not long before the commitment to a Web 2.0 culture was top-down, bottom-up, and side-to-side, all at once.

Funding
Another important contribution to the successful implementation of a Web 2.0 culture at MLS was that the Museum received significant funds to try this experiment. Without the funding for the *Take Two* project and the creation of the DIDE position in particular, it is hard to envision how most of the initiatives, and ultimately the development of a culture of shared authority and co-creation of knowledge, would have been possible.

In Conclusion

This research documented what happened at North Carolina's Museum of Life and Science over the initial two and a half years of a long-term and ongoing process as it defined and developed a Web 2.0 organizational culture. It is hoped that the process will continue to be studied in this and other museums as the field continues to embrace new technologies and to share its authority with the publics it serves.

This study described the evolution of one particular model for institutional change that incorporated philosophies of experimentation, risk-taking, shared authority, and co-creation of knowledge. The data indicated that many components of the model and change process were effective at encouraging and supporting a more open relationship between the museum and its staff, volunteers, and public than many museums are able to experience. While the study did not—and did not set out to—compare the efficacy or advantages and disadvantages of this particular approach with other models currently in existence, it is the authors' hope that readers will find useful information here that can help shape their thinking about how museums and other informal learning settings can and do incorporate new technologies and ways of thinking into their own institutional cultures.

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APPENDICES

Appendix A: Topical Framework
Appendix B: Sources of Data
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Take Two Institutional Research Study
Topical Framework

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A topical framework is a list of topics or issues we want to find out more about. It is a list of questions or issues that will be explored during the course of the study. Not all questions will be fully answered, but all questions will be explored at least to some extent. The topical framework will evolve during the course of the study as new and interesting threads are uncovered and pursued.
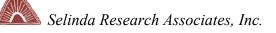
I.   ORGANIZATIONAL CONTEXT
This section asks questions about the MLS and its staff.

    a. What kind of museum is MLS? What collections do they have, what properties do they manage, and disciplines/topics do they cover? What was it before it developed into what it is today?

    b. What philosophies are programs and exhibits based on? What's MLS's mission, and how is it carried out?

    c. How is the Museum organized? What are the departments, and who reports to whom? How many staff are here, and what are the job titles and roles of the major Web 2.0 players?

    d. How have the principal players' responsibilities and job titles changed during the study, and why were those changes made?

    e. Who are the primary audiences for MLS exhibitions and programs? How are they served?

    f. What is the overall use of online and related technologies at MLS, and how does Web 2.0 fit into that?

II.   INSTITUTIONAL IDENTITY
This section asks questions about how the institution sees itself and how others see it.

    a. Does the organization have an articulated mission and if so, what is it? What is the role of this mission? (E.g., posted above staff members' desks, referred to during meetings, or is it just subtly implied?) Does there appear to be a common agreement about what the mission is, or is there a lot a variance depending on who talks about it?

    b. How do staff describe MLS and what makes it unique – within its community and beyond? How do different groups answer this question?

    c. How is MLS seen in the community? Who are its competitors?

d. How is Web 2.0 fitting in with what MLS is, and what it wants to become?
e. In what ways did MLS reach out to audiences prior to this project, and how successful was it? To what extent were these efforts part of the Museum's identity, or part of the identity of various subgroups (e.g., animal care staff)?
f. If staff had decided to reach similar goals without access to social media, how would they have gone about it?

III. DIFFUSION & ADOPTION

This section asks questions about the diffusion and adoption of Web 2.0 technologies and philosophies at MLS.

a. How did MLS decide to become involved with Web 2.0? Who or what is driving all this? What do they want to accomplish?
b. What was the process used to integrate and adopt Web 2.0 technologies, philosophies, and ways of doing business?
c. What initiatives are part of Web 2.0 at MLS? How did they originate, and how were they carried out? Was anything started and later dropped? How do these relate to older/existing programs?
d. Who are the prime movers day-to-day for these Web 2.0 initiatives? Who carries out each initiative? Who do they report to?
e. How do all the initiatives fit together to shape the user/visitor experience? Do users/visitors move between initiatives – both within and outside the Museum building/grounds? How do various players feel about this overall experience?
f. Does anyone at MLS monitor the initiatives and, if so, does anyone monitor the monitors? Have any issues come up with day-to-day practice and, if so, how have they been resolved?
g. How effective do staff consider Web 2.0 to be so far? How do they define and measure success? What obstacles did they face, and what lessons did they learn during implementation?

IV. CO-CREATION OF KNOWLEDGE

This section asks questions about how the institution and staff understand and incorporate philosophies of co-creation of knowledge.

a. How does MLS define and think about co-creation of knowledge? In what ways and to what extent is co-creation of knowledge an important construct to the Museum and its strategic plan?
b. What's the difference between co-creation of knowledge and Web 2.0, or are they considered the same thing? In what ways and to what extent is co-creation of knowledge a part of the conversations at MLS vs. Web 2.0?
c. If it was important, how did they go about trying to make co-creation of knowledge happen? How can they tell when co-creation has occurred? How do they know they are successful – what criteria indicate or measure success?
d. What are some examples of success with co-creation, and why were they successful? What didn't work, and why?
e. How has the concept of "filter for information" been adopted and implemented? Who shares what, and how is it used?

V.   SHARED AUTHORITY
This section asks questions about how the institution and staff understand and incorporate philosophies of shared authority.

a.   How does MLS define and think about shared authority? In what ways and to what extent is shared authority an important construct to the Museum?

b.   What role has this construct played in MLS's plans? How do they go about trying to make it happen?

c.   How has shared authority with MLS staff evolved? How do various players feel about shared authority within the Museum? Are all staff given permission to publish, unedited, with the Museum's name attached? Has this been an issue?

d.   How is shared authority different in different departments and divisions? For example, how do the two blogs (animal keepers vs. SERC) reflect different (or perhaps the same?) underlying philosophies of authority?

e.   How has shared authority with visitors evolved? What were early successes? What were the stumbling blocks? How can they tell when they are successful – what criteria indicate or measure success?

VI.   CONNECTIONS TO AND RELATIONSHIPS WITH COMMUNITY
This section asks questions about the construction of and quality of MLS communities.

a.   Who is served by each initiative, and what use do they make of the resources? To what extent do staff feel they are serving individuals vs. communities? What do they have to say about their relationships with each?

a.   How did any online communities come into being – and which have existence/interaction beyond whatever online medium they began with? How do the various Web 2.0 communities manifest themselves day-to-day, in virtual and real space?

b.   What is the overlap between visitors who come to the Museum and those who visit online? To what extent are they the same, how are they different communities?

c.   For the community of Museum members/frequent visitors: To what extent did staff communicate with them before, and how does that compare with the way staff and members communicate with each other now?

d.   To what extent have online communities formed with people who do not normally visit the Museum?

VII.   DEVELOPMENT OF INTERNAL RELATIONSHIPS
This section focuses on the role and contribution of Web 2.0 technologies and the development of relationships among Museum staff members.

a.   Which staff have been most involved and most successful at implementing Web 2.0? How do they explain the success? What will they do next, based on their understanding of success?

b.   To what extent has a community of Web 2.0 practice developed at MLS, and how do its members interact with each other? To what extent are staff, volunteers, members, and others part of this community of practice?

c.   What relationships have developed within MLS that might not have happened without Web 2.0 technologies? Are there sub-communities developing within the Museum? Do these relationships continue outside the Museum, e.g. social

relationships between staff members? Do folks do stuff outside of the Museum that they wouldn't have done without Web 2.0?

    d. How institutionalized is the Web 2.0 culture at MLS? Is there really a Web 2.0 culture, or is it primarily one or two people? What would happen in the organization if the primary players left? How is the Web 2.0 coordinator's position funded, and how committed is the organization to funding that position?

    e. Have some departments/staff at MLS not been participating as much in Web 2.0, and if so, why? What are the relationships between those who do Web 2.0 and those who don't?

    f. To what extent will Web 2.0 affect future hiring decisions? What will management look for in future applicants/hires?

VIII.   DAY-TO-DAY PRACTICE

This section asks questions about the role of Web 2.0 technologies in shaping how the Museum operates.

    a. How has day-to-day museum practice been influenced and shaped by the adoption of Web 2.0 technologies? Which initiatives seemed to affect day-to-day practice on the floor and in the back offices, and which did not? Has Web 2.0 had effects on class registration, visitation, how people think about their jobs, internal communications and working relationships, and so forth?

    b. Has Web 2.0 been incorporated into any exhibitions or educational programs? Does it play a role in communications with members, teachers, volunteers, or other subgroups the Museum serves?

    c. Which technologies have had greater and lesser contributions, and why?

    d. Where were there expected to be changes, but they didn't happen? What were these aspects of the Museum unaffected?

IX.   PROFESSIONAL/PERSONAL CROSSOVER

This section explores the role Web 2.0 technologies at MLS has influenced the professional/personal crossover.

    a. In what ways and to what extent is there overlap between Museum staff members' professional and personal Web 2.0 engagement? Is this contributing to a fusing of personal and professional lives, a railing against it, or some combination—what is the ultimate effect?

    b. In what ways and to what extent have MLS staff altered their use of Web 2.0 in their personal lives? How has this been related to their work at MLS and, perhaps, for other organizations they are associated with?

    c. Has Web 2.0 had an impact on the amount of work or work time for MLS staff? If so, what do they have to say about this?

X.   OUTSIDE INSTITUTIONS AND FORCES

This section explores how MLS's Web 2.0 relates to and is shaped by outside forces and organizations.

    a. What external forces have guided or shaped MLS's implementation of Web 2.0? What light can be shed on this project by looking outside MLS?

    b. What role, if any, did Science Buzz wind up playing in all this?

     c.   What museums, if any, do MLS staff admire and try to emulate? Are there other sorts of organizations they have learned from and whose ideas they are incorporating into their strategies? Are there any museums or other organizations they are consciously trying to be different from?

     d.   What resources – books, blogs, papers, Twitter, conferences – have helped shape MLS thinking about and practice of Web 2.0.

XI.   LESSONS LEARNED/FUTURE PLANS?

This section looks to the future and considers how MLS makes plans for the continuing development of Web 2.0 at the Museum.

     a.   What has MLS learned about Web 2.0 that will change what they do in the future?

     b.   How will MLS Web 2.0 strategies and practices develop over the next few months? The rest of this year? Next year and beyond? How far out is MLS comfortable planning?

     c.   How do MLS staff feel about long-range planning for online and social media? What do they have to say about earlier efforts at long-range planning?

     d.   What has MLS learned that might be worth sharing with the field?

XII.   WHAT ROLE DOES OUR RESEARCH PLAY IN ALL THIS?

This section considers how our research might have altered the course of events at MLS, or the way people think about what happened.

     a.   What, if anything, are MLS staff doing or doing differently because they know we are watching?

     b.   How might things be different if we weren't part of the process?

Data type	Number	Description	Contact hours
Phone interviews	2	2008 phone interviews with key MLS staff.	2.0
In-person group interviews	4	Group interviews with MLS staff during September 2008 site visit. These include interviews with key administrative staff, educators, Animal Department staff, and an inter-departmental team working on an exhibition; 21 staff participated.	4.0
In-person interview	3	Initial and mid-project interviews with key MLS staff.	3.5
Phone interviews	6	March-April 2010 phone interviews with key MLS staff.	8.0
Interview Totals	**15**		**17.5**
Monitoring of online initiatives	60	MLS websites, social media pages, and other online initiatives were continuously monitored from summer 2008, through winter 2010.	40.0
On-site observations	1	Tours and observations of MLS facilities and exhibitions during September 2008 site visit.	3.0
Document review	25	Printed/PDF documents, SlideShare presentations, e-mail threads, etc., reviewed spring 2010	20.0
Final review of online initiatives	(same 60 as above)	All Web 2.0 and online initiatives were reviewed during spring 2010. Many of these are listed in Appendix E. (Personal Twitter accounts and blogs are counted here but not listed in Appendix E.)	30.0
Monitoring/ Observation/ Review Totals	**86**		**93.0**

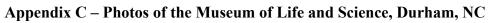**Appendix C – Photos of the Museum of Life and Science, Durham, NC**

Figure C-1. Museum of Life and Science exterior and entrance.

Figure C-2. Interior of the *Magic Wings Butterfly House*.

Figure C-3. Signage and audio interaction along *Explore the Wild*'s boardwalk.

Figure C-4. *Explore the Wild*'s pond and boardwalk.

Figure C-5. *Explore the Wild*'s outdoor bear enclosure.

Figure C-6. Interactive exhibits at outdoor bear enclosure.

Figure C-7. Air Cannon interactives, part of the *Catch the Wind* outdoor exhibition.

Figure C-8. Dinosaur model to be included in the *Dinosaur Trail* exhibition (photographed during construction, September 2008).

Figure C-9. Prototype version of the *Contraptions* exhibition (photographed September 2008).

Photo credits: All photos by Deborah L. Perry, September 2008.

Appendix D – Overview of Web 2.0 Initiatives at MLS

This appendix provides a narrative overview of the major Web 2.0 initiatives that were produced at MLS. It is divided into two sections: initiatives that mainly served the public, and ones that mainly served the staff. Links to all the initiatives are included in Appendix E, and screenshots of many of them are in Appendix F.

Initiatives that Mainly Served the Public
As summarized in Appendix E-1, major public initiatives included the Museum's three blogs—the *Animal Department Blog*, *Greg Dodge Journal*, and *The Science Education Blog*. Other major initiatives included social media accounts on Facebook and Twitter; a range of initiatives on the photo-sharing website Flickr; online videos, shared mostly on YouTube; and bookmarked Web links shared using Delicious and FriendFeed.

Access to these public initiatives could be gained through the Museum's website, whose homepage was redesigned to highlight Web 2.0 initiatives. Staff described the revised website as more dynamic, more about learning, and less about marketing than earlier incarnations of the MLS website. As seen on Figure F-1 (in Appendix F), the menu on the left of the home page (Fig. F-2) provided links to the most recent posts from the Museum's blogs as well as links to a different sort of online resource: blog posts written by visitors about the Museum. Clicking on the "more visitor blogs" link led to a Delicious page with summaries and links to selected blog and blog-like posts written by visitors to the Museum. A separate menu on the bottom of the home page (Fig. F-3) linked to the Museum's major social media initiatives, like Facebook and Flickr.

The Museum's official Facebook (Fig. F-4) and Twitter (Fig. F-5) pages were used to highlight MLS events and social media posts as well as to share stories and links of interest to their fans and followers. The Facebook page also allowed users to share their own comments, links, and photos with the group. Facebook also hosted an unofficial group created by a fan of the Museum, called "Museum of Life and Science RULES!" Fans and friends of the Museum posted their memories of past visits to MLS as well as their plans for future visits. (Although MLS staff members were listed as co-moderators of this group, it still was all about what *visitors* remembered, thought, and felt about the Museum.) In addition to the Museum's official Twitter account (run by the DIDE(Director of Innovation and Digital Engagement)), MLS maintained two automated Twitter accounts. The Museum Mom Alert automatically posted links to any Twitter tweets or blog posts written by mothers who visited the MLS with their families; Museum Dad Alert did the same for dads who posted about the Museum.

In addition to displaying a stream of new photos from Museum staff and visitors, the Museum of Life and Science Flickr page (Fig. F-6) provided access to four collections of photos. The *Butterfly Keeper* collection included photos of butterflies and moths from the MLS Butterfly House. The *Flicker Plant Project* included both photos of living plants from the Museum's collections and links to photos of the same species taken by plant enthusiasts from around the world. *Name That Zoom* displayed the images at the core of the online contest of the same name

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and provided participants with a place to post their guesses. Also, the MLS Exhibits Department maintained a Flickr photostream as well as collections with photos of recently opened exhibits and exhibits currently under development. Finally, MLS maintained a public Flickr group where visitors could post photos taken during their own visits to the Museum.

The MLS YouTube channel (Fig. F-7) included a continuous stream of videos by Museum staff as well as two special collections: (a) *Munch Cam!* included up-close videos of Museum animals eating; and (b) *Science in the Triangle* videos were about scientific research being done by researchers working near the Museum's home in the Triangle area of North Carolina. In addition, the Museum maintained a video channel on Vimeo, a YouTube rival, but few videos were posted there.

MLS staff developed public bookmark pages to help users keep track of all the online articles and stories written about the Museum as well as content created by Museum staff. A Delicious page, (Fig. F-8), linked to online articles written about the Museum. A FriendFeed account, (Fig. F-9), included links to all MLS blog entries, Flickr photos, and YouTube videos posted by Museum staff, in reverse chronological order.

MLS staff worked to better integrate their Web initiatives with the Museum experience. Two examples included in Appendix E-1 were related to recently opened exhibits. With both *Dinosaur Trail* and *Contraptions*, MLS staff thought critically about and incorporated the web "from the get-go," including Web 2.0 tools and social media in the planning process. Dedicated web pages were developed along with the exhibitions.

The *Dinosaur Trail* outdoor exhibition, which opened in the summer of 2009, had its own homepage (Fig. F-10), that included descriptions of the exhibition and links to podcast tours and activities, as well as a range of social media links. By following these links, visitors could post photos they had taken in the exhibition on Flickr, read blog posts by other visitors that mentioned the *Dinosaur Trail*, and find out what professional paleontologists were blogging about dinosaurs and paleontology. The links to paleontologist blogs were an attempt to account for the ever-changing research without having to rebuild their expensive life-sized models or re-write labels.

When the *Contraptions* exhibition opened in spring 2010, its homepage was still under development. However, the exhibition already had its own YouTube channel (Fig. F-11) devoted to videos uploaded in the *Contraptions* exhibition, as well as forum spaces where visitors could suggest additional materials that could be included in the exhibition or help MLS staff decide which inventors to feature in the exhibition.

In addition to these exhibition-centered initiatives, the adult program, *Periodic Tables*, was supported by a complex of Web 2.0 and social media applications, including a web page, Facebook page, Flickr set, and a place where speakers could share their presentation slides (using SlideShare).

Finally, MLS staff attempted to bridge the gap between their online communities and the Museum's exhibitions by inviting selected bloggers, Twitter followers, and Flickr subscribers to

special events at the Museum. Bloggers who had written about the Museum were invited to a special event as part of the *Dinosaur Trail* opening, and participants in the *Name That Zoom* contest were invited to a special, adults-only event in *Contraptions*. Staff regarded these events as part of their effort to include more adults as life-long learners at the Museum.

Initiatives Intended for MLS Staff and Other Professionals

In addition to the many Web 2.0 initiatives developed specifically for the public, MLS staff developed a number of online initiatives for their own use, and some of these are also available to other museum professionals. The major initiatives in this category are listed in Appendix E-2.

For instance, the DIDE maintained *useum*, a blog on Tumblr, where she could post thoughts and comments on her work at the Museum, as well as links to job-related presentations and the latest social media content produced by other MLS staff. As noted earlier, the MLS Exhibits Department used Flickr to post photos of new exhibitions as well as exhibits currently under development. In addition, they maintained a Delicious account where they had bookmarked more than 600 online resources. The DIDE also posted scans of drawings made during the weekly staff gatherings at the Pinhook bar and created SlideShare versions of the presentations she gave to MLS staff and others.

A number of other online initiatives were password-protected and available only to MLS staff. These included a Museum intranet, which included a variety of tools to help MLS staff with their work. The DIDE noted that, although intranets are usually not considered to be Web 2.0 technologies, she classified the MLS intranet under *Take Two* because it helped at least some MLS staff become more comfortable with technology and with using technology in new ways. An online forum on the intranet, IdeaScale, allowed Museum staff to post ideas and suggestions for new initiatives and vote on others' ideas. Yammer was a kind of microblog made available to all MLS staff, where they could post work-related updates, comments, and announcements.

With the DIDE's guidance, MLS staff began developing their own online tools to facilitate their work, and in particular their cooperative efforts with other staff. For example, staff used information sharing tools like Google Wave[19] and Drop Box[20] to facilitate work on grant applications and other projects. These proved particularly useful to employees who sometimes worked from home and needed access to shared materials outside the Museum's network. Additionally, the staff member who supervised volunteers in the *Investigate Health Lab* and *Contraptions* exhibitions worked with the DIDE to develop a Google Sites[21] website for her volunteers. The volunteers mostly used the site for scheduling and sharing of information about the labs, including YouTube videos of *Lab* activities. Volunteers could fill out and get copies of the volunteer work schedule and download the activities done in the *Lab*. There were also tools that allowed volunteers to contribute to the website in various ways, although these were not used much during the first month the volunteer website was online.

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[19] See https://wave.google.com/wave/ and http://en.wikipedia.org/wiki/Google_Wave
[20] See https://www.dropbox.com/ and http://en.wikipedia.org/wiki/Dropbox_%28storage_provider%29
[21] See http://sites.google.com/ and http://en.wikipedia.org/wiki/Google_Sites

Appendix E – Complete Inventory of Web 2.0 Initiatives at MLS

(This appendix was developed with major contributions from Alex Curio.)

Appendix E-1: Initiatives that Mainly Served the Public

Component/Link	Type	Description	# Users/Members/Views	Notes
General				
MLS Homepage http://www.ncmls.org/	web page	Provided information about MLS and links to most of the online initiatives	[unknown]	See Figures F-1 through F-3 in Appendix F
List of online initiatives http://claimid.com/ncmls	claimID page	Listed most of the major social media initiatives by MLS	[unknown]	claimID is a way to manage online identity
Blogs				
What We're Blogging **http://friendfeed.com/life andscience** Another URL included basically the same FriendFeed information: http://feeds2.feedburner.com/life andscience	FriendFeed page linked to MLS Home Page	Compiled and linked to latest posts on MLS blogs and Flickr	as of 4/12/10: "about 1 post per day" 46 subscribers	Selected posts are also listed on the MLS Home Page.
Greg Dodge Journal **http://blogs.ncmls.org/gr eg-dodge/**	Blog by Greg Dodge, MLS Ranger	Readers could read about, and see pictures of, flora and fauna that Greg spotted throughout the week, along with specific locations of sightings.	[unknown]	From blog: "Greg Dodge is a professional naturalist as well as a writer, videographer and producer of natural history DVDs."
Animal Department Blog **http://blogs.ncmls.org/ke epers/**	Blog by keepers who care for live animals at MLS	Readers could find "updates and information from the Animal Department" written by Animal Department staff.	[unknown]	Five of the nine Animal Department staff contributed posts.
The Science Education Blog **http://mls-serc.blogspot.com/**	Blog by staff of the Science Education Resource Center at MLS	Readers could read about MLS education staff activities, MLS programs and events, science kits, and general science-related information.	as of 4/12/10: 4 followers	
What You're Blogging **http://delicious.com/ncm ls/blogger**	Delicious page	Included summaries and links to blog posts about MLS made by visitors and others members of the public.	as of 4/12/10: 422 bookmarks [unknown # of users]	Selected posts were also list on the MLS Home Page.

Component/Link	Type	Description	# Users/Members/Views	Notes
Facebook				
Facebook Official Fan Page http://www.facebook.com/lifeandscience	Facebook Fan Page posted by MLS staff	MLS posted about local science research and MLS events. Fans posted on the wall several times a month.	*as of 4/14/10:* 1,620 fans	See Figure F-4 in Appendix F
Museum of Life and Science RULES! http://www.facebook.com/group.php?gid=19463788504	Facebook group created by a *fan*	"A group to celebrate the MLS in Durham NC"— especially exhibits from earlier decades.	*as of 4/14/10:* 252 members	Two MLS staff were listed as administrators
Twitter				
Museum Life+Science @ lifeandscience http://twitter.com/lifeandscience	Museum's official Twitter account		*as of 4/14/10:* 3,000 followers	See Figure F-5 in Appendix F
Museum Mom Alert http://twitter.com/momalert	Twitter bot	Automatic feed tweeted whenever it discovered a mom who blogged or tweeted about her visit.	*as of 4/14/10:* 75 followers	
Museum Dad Alert http://twitter.com/dadalert	Twitter bot	Automatic feed tweeted whenever it discovered a dad who blogged or tweeted about his visit.	*as of 4/14/10:* 131 followers	
Personal Twitter accounts		In their personal accounts, staff sometimes posted about MLS topics and events.	*as of 4/14/10:* 12 MLS staff	
Photos				
Share Your Experience http://www.ncmls.org/share	web page	Instructions on how to share photos of visits on Flickr page	[unknown]	See Figure F-6 in Appendix F
MLS Flickr Group http://www.flickr.com/groups/lifeandscience	Flickr group	Visitors posted their own photos taken at MLS.	*as of 4/10/10:* 37 members Oldest photo viewed 330 times.	
MLS Photostream http://www.flickr.com/photos/ncmls	Flickr photostream	Photos posted by MLS staff	*as of 4/10/10:* 37 members Oldest photo viewed 18 times.	Most recent photo is at top of page.
The Butterfly Keeper http://www.flickr.com/photos/ncmls/collections/72157623202743284/	Flickr photo collection	Photos of butterflies and moths from MLS Butterfly House	*as of 4/10/10:* Photo views vary from <10 to >130 times.	
Name That Zoom http://www.flickr.com/photos/ncmls/sets/72157622357821535/	Flickr photo collection	Contest run by MLS staff.	*as of 4/1/010:* Name That Zoom #1 viewed about 260 times.	See also #namethatzoom Leader Board http://www.ncmls.org/namethatzoom

Component/Link	Type	Description	# Users/Members/Views	Notes
Photos (cont.)				
Flickr Plant Project http://www.flickr.com/photos/ncmls/sets/72157609389865511/	Flickr photo collection	"Documenting plants at the Museum of Life and Science in Durham, NC."	*as of 4/10/10:* Project page viewed about 620 times.	"Updated every week on Tuesday." Users linked to their own photos of the same species.
MLS Exhibits Department http://www.flickr.com/photos/mlsexhibits	Flickr photostream	Photos of exhibits and grounds by Exhibits staff	*as of 4/12/10:* 11-day-old photo viewed 37 times, with 1 comment.	
Snow Day at the Museum http://www.flickr.com/photos/mlsexhibits/sets/72157623204400751/	Flickr photo set	Flickr photos by Exhibits staff	*as of 4/12/10:* Photos viewed from about 10 to more than 65 times	
Videos				
NCMLS YouTube channel http://www.youtube.com/user/ncmls	YouTube channel	Links to all MLS-related videos; included videos from the *Animal Department Blog*, interviews with science experts, and MLS events & exhibits.	*as of 4/14/10:* 103 subscribers 6,000 channel views 78,600 total upload views	See Figure F-7 in Appendix F
Munch Cam! http://www.youtube.com/profile?user=ncmls#p/c/18E04DEB007EC4BC	YouTube channel	Viewers could "get a unique, close up and personal perspective on the different ways our Museum animals eat with Munch Cam."	*as of 4/14/10:* Videos had been viewed from 800 to 5,300 times.	
Science in the Triangle http://www.youtube.com/profile?user=ncmls#p/c/6025A28D91174C30	YouTube channel	Viewers could watch "episodes" dealing with science topics, events, or experts from the Triangle area (Durham-Chapel Hill-Raleigh) of North Carolina.	*as of 4/14/10:* Videos had been viewed from 185 to 4,800 times.	
Contraptions Videos (See *Exhibition: Contraptions* below)				
Bookmarks and Feeds				
Delicious http://delicious.com/ncmls	Delicious page	Linked to all manner of online content by newspapers, bloggers, and other sources	[unknown]	See Figure F-8 in Appendix F
FriendFeed http://feeds2.feedburner.com/lifeandscience	FriendFeed page	Linked to content produced by MLS staff	[unknown]	See Figures F-9 in Appendix F

Component/Link	Type	Description	# Users/Members/Views	Notes
Exhibition: Dinosaur Trail				
***Dinosaur Trail* Home Page** http://www.ncmls.org/dinosaurs	web page on MLS website	Linked to all sorts of information and activities related to the *Dinosaur Trail* exhibition	[unknown]	See Figure F-10 in Appendix F
Visitor Created - Share Your Experience http://www.ncmls.org/dinosaurs/share	web page on MLS website	Explained the ways that visitor could help create the *Dinosaur Trail* website	[unknown]	
Durham Dinosaur Sightings http://www.flickr.com/groups/dinos-in-durham/	Flickr group	Visitors could post photos they have taken along the *Dinosaur Trail*	*as of 4/17/10:* 54 members	
What Visitors Are Blogging http://delicious.com/ncmls/blogger+dinosaurs+4web	Delicious page	Excerpts and links to blog posts by visitors that mention *Dinosaur Trail*	[unknown]	
What Paleontologists Are Blogging http://delicious.com/mlsexhibits/blogger+dinosaurs+4web	Delicious page	Excerpts and links to blog posts about dinosaurs and paleontology	[unknown]	
Flickr photos supporting *Fossil Dig* exhibit http://www.flickr.com/photos/ncmls/3738409001/ http://www.flickr.com/photos/ncmls/3707258555/			*as of 4/17/10:* both viewed 530 times	
Exhibition: Contraptions				
***Contraptions* website** http://www.ncmls.org/contraptions/index.html				As of 4/17/10 this page was still under development
thisismycontraption channel http://www.youtube.com/user/thisismycontraption	YouTube channel	A place to store selected videos uploaded from the *Contraptions* exhibition	*as of 4/17/10:* 3 subscribers The most popular video had been viewed 48 times	See Figure F-11 in Appendix F
thisismymaterial forum http://lifeandscience.uservoice.com/forums/40077-thisismymaterial	Forum on MLS website	A forum where visitors could help MLS staff decide on additional materials to add to *Contraptions*	[unknown]	
thisismyinventor forum http://lifeandscience.uservoice.com/forums/40075-thisismyinventor	Forum on MLS website	A forum where visitors could help MLS staff decide which inventors to highlight in *Contraptions*	[unknown]	

Selinda Research Associates, Inc.

Component/Link	Type	Description	# Users/Members/Views	Notes
Exhibition: Contraptions (cont.)				
#namethatzoom Blogger/Tweeple Invite http://www.ncmls.org/invite	Page on MLS website	Invitation to a special meet-up in the *Contraptions* exhibition	[unknown]	
Periodic Tables				
Durham's Science Cafe http://www.ncmls.org/periodictables	web page	Provided program information and schedule of upcoming events.	[unknown]	
on Facebook http://www.facebook.com/periodictables	Facebook fan page	Monthly postings informed fans of the upcoming month's event	*as of 4/10/10:* About 300 fans	Tag line: "Cold beer. Hot food. Cool Science!"
on SlideShare http://www.slideshare.net/PeriodicTables	SlideShare page	Shared slides used during completed presentations.	*as of 4/10/10:* Earliest presentation viewed more than 1100 times.	
on Flickr http://www.flickr.com/photos/ncmls/sets/72157610665718211/	Flickr set	"These are pictures from the Museum of Life and Science's science café, Periodic Tables."	*as of 4/10/10:* About 170 views	"We meet on the second Tuesday of every month at Broad Street Café."

Appendix E-2: Initiatives that Mainly Served MLS Staff or Other Professionals

Component/Link	Type	Description	# Users/Members/Views	Notes
Accessible to the Public				
useum http://useum.tumblr.com/	Blog-like web page	Posts by DIDE included a blog where short pieces of Museum- and Web 2.0-related information and news were posted, and a "stream" of MLS Web 2.0 activity (blogs, Twitter, etc.)	[unknown]	Although the content was available publicly, there were no links to *useum* on the MLS website.
MLS Exhibits bookmarks http://delicious.com/mlsexhibits	Delicious page	Bookmarks posted by the MLS Exhibits Department	*as of 4/18/10:* 619 bookmarks	
The Pinhook Drawings http://www.flickr.com/photos/10ch/sets/72157623215069820/	Flickr photo set	"A collection of napkin tennis drawings from various Pinhook goers" during weekly gatherings there	*as of 4/18/10:* Earliest post (1/10/10) had been viewed 46 times.	From Flickr page: "Napkin Tennis is a game we play at a local bar, The Pinhook."

Component/Link	Type	Description	# Users/Members/Views	Notes
Accessible to the Public (cont.)				
Museum of Life and Science State of the Web http://www.slideshare.net/ btench/museum-of-life-and-science-state-of-the-web	SlideShare presentation		*as of 4/18/10:* 1484 views	
Using Delicious and Yahoo Pipes! to Co-Create a Website http://www.slideshare.net/ btench/dino-web-training	SlideShare presentation		*as of 4/18/10:* 257 views	
3 Examples of Digital Engagement at Museum of Life and Science http://www.slideshare.net/ btench/3-examples-of-digital-engagement-at-the-museum-of-life-and-science	SlideShare presentation		*as of 4/18/10:* 787 views	
Luxury of Contemplation http://www.slideshare.net/ btench/luxury-of-contemplation	SlideShare presentation		*as of 4/18/10:* 687 views	
Scio09 Doing Really Neat (and free) Things With Google Alerts http://www.slideshare.net/ btench/scio09-doing-really-neat-and-free-things-with-google-alerts-presentation	SlideShare presentation		*as of 4/18/10:* 1107 views	
Museum of Life and Science Membership Model http://www.slideshare.net/ lifeandscience/museum-of-life-and-science-membership-model-presentation	SlideShare presentation		*as of 4/18/10:* 323 views	

Component/Link	Type	Description	# Users/Members/Views	Notes
Password Protected Sites				
MLS Intranet	A password protected website accessed by MLS staff only	Included tools to create project web pages, schedules, meeting agendas and minutes, and store reports, plus a "sandbox" to try out new ideas.	[unknown]	Stated purpose was to make staff members' work lives easier and to create a space where staff feel safe and smart.
MLS IdeaScale	Forum on MLS Intranet	MLS employees could post ideas or suggestions relating to new MLS services, initiatives, or projects. Employees could also vote others' ideas up or down, and make comments.	About a dozen staff had participated.	MLS employees could access the IdeaScale account by following a link on the MLS Intranet homepage.
Lab Volunteer Team	Google Sites	Website developed by the facilitator of the *Investigate Health Lab* to keep *Lab* volunteers informed and allow them to schedule themselves.	[unknown]	
Yammer	Microblog tool for employees of organizations and companies	MLS staff could post short work-related updates, comments, or announcements. Updates were organized as a continuous feed.	More than a dozen staff had participated.	MLS Yammer use and viewing was limited to MLS employees who had an email address ending in @ncmls.org

Appendix F – Screenshots of Online Initiatives at MLS

Images copyright the Museum of Life and Science, Durham, NC, and used with their permission.

Figure F-1. Screenshot of MLS home page < http://www.ncmls.org/ >. Links to Web 2.0 initiatives were most prominent (a) on the left menu bar and (b) near the bottom of the page. (Note that this photograph is a composite of two images.) (Taken March 9, 2010.)
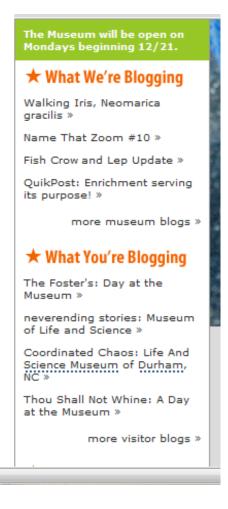
Figure F-2. An enlargement of the left menu from the MLS home page (see Fig. F-1). "What We're Blogging" linked to content produced by Museum staff. The "more museum blogs" link took users to a Friendfeed page < http://friendfeed.com/lifeandscience >. "What You're Blogging" linked to blog posts by Museum visitors, as selected by MLS staff. The "more visitor blogs" link took visitors to a Delicious page with more links to visitor blogs < http://delicious.com/ncmls/blogger >.

Figure F-3. Enlarged screenshot of bottom of the MLS home page, with links to six of the social media initiatives for the public—Facebook, Twitter, Flickr, YouTube, Delicious, and FriendFeed (represented by the orange RSS symbol). (Taken March 9, 2010.)

Figure F-4. Screenshot of MLS Facebook Official Fan page. This page and the others in this appendix continued "below the fold" as users scrolled down page. (Taken April 16, 2010.)
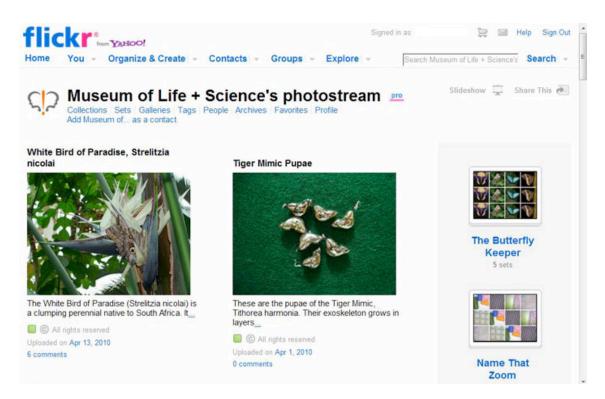
Figure F-5. Screenshot of MLS Twitter page. (Taken April 16, 2010.)

Figure F-6. Screenshot of MLS Flickr page. (Taken April 16, 2010.)

Figure F-7. Screenshot of MLS YouTube page. (Taken April 16, 2010.)

Figure F-8. Screenshot of MLS Delicious page. (Taken April 16, 2010.)

Figure F-9. Screenshot of MLS FriendFeed page. (Taken April 16, 2010.)

Figure F-10. Screenshot of MLS *Dinoaur Trail* web page. (Note that this photograph is a composite of two images.) (Taken April 17, 2010.)

Figure F-11. Screenshot of the MLS *Contraptions* exhibition's YouTube channel. (Note that this photograph is a composite of two images.) (Taken April 17, 2010.)

Appendix G – Organizational Chart for the Museum of Life and Science

On the next page is a simplified organizational chart for the Museum of Life and Science. This chart was developed by the researchers based on the data gathered for this report, and is not an official organizational chart. All four Vice President (VP) positions are shown, but the other levels of the hierarchy show only those with staff who (a) had produced content for Web 2.0 as of spring 2010 (marked with an asterisk), (b) were projected to become more involved in the future, or (c) who supervised such staff.

KEY: * = Produced content for Web 2.0

President and CEO
- VP for Administration/CFO
  - Director of Guest Relations
    - *Guest Relations Associate *BioQuest*
  - Assoc. Director for Learning Communities
    - *Education Resources Manager
    - *SERC Specialists
- VP for External Relations
  - *Director for Membership Advancement
  - Director for Marketing
- VP for Exhibits and Planning
  - *Animal Director
    - *Animal Keeper staff
  - *Butterfly House Director
    - *Insectarium Manager and Entomologists
    - *Conservatory and Horticultural staff
  - Exhibits Director
  - *Exhibits Development Manager
- *VP for Innovation and Learning
  - *Director for Nanoscale Informal Science Education
  - Director for Family and School Experiences
    - *Investigate Health Lab and Exhibit Facilitator
    - *Manager of Public Engagement with Science
    - Master Teachers
  - *Director for Innovation and Digital Engagement

Appendix H – Timeline of Major Web 2.0 Events

The chart below provides a timeline for development of Web 2.0 at the Museum of Life and Science and for this *Take Two Institutional Research Study (TIRS)* project. *TIRS* events are italicized.

2007											
Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
early **Web 2.0** discussions			**Animal Dept.** began internal blogging			MLS joined **You-Tube**		oldest **You-Tube** video	**Animal Dept. Blog** went public **Take Two** funding received	**MLS Website** revised	

2008											
Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Science Buzz kiosk installed	*first TIRS interview*			**Greg Dodge Journal** began		**DIDE** started oldest **Flickr** posts **MLS Twitter** began		**SERC Blog** began *TIRS site visit to MLS*	first **Periodic Tables** science cafe		

2009											
Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
first **Experi-month**		DIDE's revision of **MLS Website**	official **Facebook** page started			new **Dinosaur Trail** opened **Dinosaur Trail** web page went public		first **Name That Zoom**			

2010											
Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
			Contraptions opened	*TIRS data collection ended*					**Take Two** received one-year no-cost extension		