Fluid Engage

January 30, 2009

A Proposal to The Andrew W. Mellon Foundation

By

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In Partnership With:

Detroit Institute of Arts

McCord Museum of Canadian History

Museum of the Moving Image

Open University of Catalonia

Simon Fraser University

University of Cambridge

University of Colorado

And other partners.

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Executive Summary

To address the challenge of retaining public interest and remaining relevant in an information-rich society transformed by the ubiquity of information technology and the web, cultural institutions are working to expand the means by which they engage visitors or patrons. At the moment curators or educators within museums and galleries are using three (potentially integrated but frequently disjointed) environments:

1. The physical space (often augmented or mediated by computers)
2. The Web (also referred to as the virtual or online museum or gallery) including social networking applications, and
3. Mobile device interaction (whether supplied by the institution or through the patron's personal cell phone or mobile device).

The applications or systems available to support the creation of exhibits or environments do not:

- interoperate, requiring redundant content creation and information entry,
- enable the creation of user experiences that address the diversity of visitor or patron needs or enable user experience design that matches the creative vision of museum designers, and
- produce accessible exhibits and experiences (or meet legislative requirements for equal access).

The Fluid Engage project will:

- create a service layer that provides an interoperable mesh for existing applications available to museums in all three environments, is extensible to enable the integration of new tools and where necessary fills gaps in functionality (e.g., location-aware and context-aware personalized mobile applications)
- extend the work of the Fluid Project to provide a personalizable, reconfigurable user experience layer for museum applications and generic applications applied in museums and galleries
- develop the tools and resources needed for museums to create accessible exhibits and experiences in all three environments, thereby meeting legal commitments while at the same time making the experiences more usable and engaging for all visitors

This will enable curators and other visitor experience designers and developers in museums and galleries to:

- realize their creative vision in the online, mobile and physical realm,
- create seamless, engaging visitor experiences that respond to shifting interests and integrate popular or familiar applications and tools,
- reduce the redundant creation of content, avoid content obsolescence, integrate new applications, and
- create inclusive visitor experiences that meet the diversity of visitor needs and interests.

This project will be conducted over 12 months by a collaborative community made up of museums, galleries, universities, and leaders in the field. Collectively this community is contributing over $1,400,000 to achieve the project goals.

Project Motivations and Contributions

The Critical Challenges to be Addressed

In the present information-rich society where information technology is ubiquitous, and cultural information can be summoned at any time, museums and galleries are struggling to remain relevant. To retain or regain the interest of a public distracted by an overabundance of information and media, cultural institutions are appropriating popular digital systems and exploring a multiplicity of platforms to engage visitors or patrons.

At the moment curators or educators within museums and galleries are using three (potentially integrated but frequently disjointed) environments:

1. the physical space (often augmented or mediated by computers)

2. the Web (also referred to as the virtual or online museum or gallery) including social networking applications, and

3. mobile device interaction (whether supplied by the institution or through the patron's personal cell phone or mobile device).

By consulting museum and gallery curators, directors, and individuals responsible for educational programming at cultural institutions over the last few months the following priority problems and needs associated with creating engaging visitor experiences were identified.

1. Accessibility

All cultural institutions, but especially publicly funded institutions, must be accessible to visitors with disabilities by law or policy. Recent lawsuits have made museums acutely aware of this legal obligation. The following is an excerpt from a recent settlement between the Department Of Justice and the International Spy Museum in the US, http://www.ada.gov/spymuseumfctsht.html, (over the past 8 months similar settlements were reached with the Country Music Museum, the Haines Museum, and the Great Lakes Museum, to name just a few):

> *"Requirements of title III of the ADA*
>
> *Title III of the ADA applies to private entities such as museums, restaurants, and stores. It requires that public accommodations ensure that no individual with a disability is discriminated against on the basis of a disability in the full and equal enjoyment of the entities' goods, services, and facilities. Where necessary, a public accommodation must also provide appropriate auxiliary aids and services in order to*

ensure effective communication. Title III also requires removal of barriers to access in existing facilities where it is readily achievable to do so. Any new construction or alteration to any buildings or facilities, including exhibitions, must be made in such a manner that those buildings or facilities meet the requirements of the physical accessibility standards.

People with disabilities and tourism

Millions of people with disabilities regularly travel, visit museums and eat out with family and friends. The U.S. Census Bureau's 2002 Survey of Income and Program Participation found that there are 51.2 million Americans with disabilities, almost 16 million of whom have sensory disabilities (loss of hearing or vision.)

As more and more museums and other popular tourist destinations – including visitor centers for historic sites, aquariums, attractions such as amusement parks, and even libraries – use interactive and multimedia exhibits and other innovative means to provide access to their collections, the need to provide effective communication for people with vision and hearing disabilities can be easily overlooked. This agreement will serve as a model for ensuring enjoyment of those facets of American life by all individuals, as required by the ADA."

While museums have a good understanding of architectural accessibility and the need for alternative print formats, there is a great deal of confusion about how to make wayfinding, physical exhibits, online environments and mobile experiences accessible. There are few exemplars or reusable, shared resources in this area. All museums identified this as a priority not only to mitigate legal risk, but also to expand the museum or gallery experience to a larger user base and to accommodate the needs of aging patrons.

2. Lack of Integration and Continuity

There is no continuity or integration of the three environments listed above, for curators or visitors. Curators or education directors must learn three sets of tools, strategies and practices for the computer mediated or augmented physical space, the online space and the mobile space. Frequently, digital file formats are inconsistent, user interfaces cannot be transferred, and content must be updated separately. Consequently these functions are frequently administered separately and work is performed redundantly in large institutions and but also in small institutions. One effect of this discontinuity is that the visitor experience of these forms of engagement lacks continuity or cohesion and few visitors make the transition from one form of engagement to another.

3. Chaos in the Mobile Space

Most museums and galleries see engagement through mobile devices as the next wave of innovation and a necessary part of their programming. However, while there are sporadic bursts of excitement and innovation in this area, the tools standards and technologies needed to apply this mode of engagement more broadly are poorly developed, usually proprietary, rarely reliable and frequently completely unsupported. Hence it is not an exaggeration to say

that the mobile museum experience is often poorly designed, poorly supported, poorly integrated and rarely sustained.

4. Lack of Integration of Digital Collections with Exhibit or Curation Tools

Extensive, well-organized digital collections are needed to create a substantial online or mobile visitor experience. Many museums are addressing this need with substantial digitization programs and public funding programs in most countries provide financial support to achieve this digitization. There are also efforts to enable federated search between collections and to provide tools to effectively manage collections. One critical piece of missing functionality is the effective integration or linking of digital collections with methods of presenting or curating the collections (see 6 below).

5. Poor user experience design

While curators and education directors are skilled and adept at creating physical exhibits many are ill equipped to realize their intended designs in an online environment or mobile device environment. Many express deep frustration with the authoring and design tools available to them. The result is poor, or at best inconsistent, user experience design. This user experience is also rarely accessible. Designs created for one exhibit are not reused or repurposed. The large investment made in interactivity is infrequently extended beyond the original subject matter.

6. Lack of flexibility in Web Authoring Systems

There are a number of notable and successful online curation tools including Pachyderm (http://pachyderm.nmc.org) and Omeka (http://omeka.org) that assist museums in creating online exhibits. In our discussions with museums and galleries a common criticism of these tools is that they lacked flexibility in layout, presentation and user experience. It was felt that these tools imposed an inflexible, standard look or behavior and did not allow for institutional expression, creative layout, mash-ups or modular enhancements. The tools also lacked supports for creative or varied interactivity. The output is not accessible or ADA compliant.

7. Lack of integration of museum and gallery tools with tools in education

Most museums and galleries have a mandate to support and link to education programs and are adept at organizing and conducting educational tours. Interpretive guides for students are exemplary and constitute some of the best curriculum material available to educators and scholars. One of the challenges curators and museum education personnel face is that museum tools and digital collections are not integrated or compatible with online tools or environments used in most educational and research institutions. This creates a discontinuity and restricts the amount of interaction between the museum or gallery and the educational institution.

8. Lack of integration of social networking environments

The disruptive forces of information technology advances on public conceptions of expertise, authority and knowledge have not left museums untouched. As sandboxes for exploring emerging ideas and mirrors of collective cultural musings many museums have courageously turned knowledge and interpretation structures on their heads and opened the doors to public participation in generating content, participating in interpretation and engaging in curation. Museums have also long recognized their role as social spaces. Consequently many museums have begun to make use of social networking tools with fairly enthusiastic public response. However these social networking tools are not integrated with other museum applications, requiring a separate and redundant set of skills and processes. This taxes an already under-resourced technical team and does not capitalize on the potential of social networking within cultural institutions.

More generally the consensus is that museums have overcome the constraints of physicality and begun to explore online alternatives and enhancement, but for the average curator or education director this terrain is in chaos. While technology-savvy pioneers are exploring exciting new possibilities, most curators must contend with very little integration of tools or content, few guidelines or supports for user experience design, no support for reuse or repurposing and no guarantee that large investments in gaining the skills needed to become familiar and adept in the terrain will not result in orphaned content, unsupported online environments and irrelevant knowledge.

High Level Goals

Fluid Engage will create an open source community that will provide curators and educators within museums and galleries the necessary supports, tools and resources so that they in turn can:

- Create engaging visitor experiences across all three exhibit environments: the computer mediated physical space, online and through mobile devices.
- Provide accessible exhibits and experiences in these environments, thereby meeting legal commitments while at the same time making the experience more usable and engaging for all visitors.
- More seamlessly and efficiently integrate existing and new applications applied in museums to create engaging visitor experiences (content management system, collection management systems, maps, social software, mobile applications, and beyond)
- Bridge the gap between creative design vision and its expression in the digital realm and participate in the larger user experience design community.

Project Impact

Why is Fluid Engage a Priority for Museums and Galleries?

The common consensus within the museum community is that the Fluid Engage project is highly ambitious and critically important to the field. Museum and gallery directors agree that it is also not a project that any one institution, no matter what its size, could embark upon. Much of the work and investment is in service of mid-to-long-term benefits, sustainability and the greater collective good and is therefore not something institutions struggling with immediate local needs and demands can afford to consider. But the work Fluid Engage has outlined is critical to the health and wellbeing of museums and galleries. Especially in these times of fiscal restraint museums cannot afford to contend with the disjointed, chaotic and dysfunctional systems available to them. To maintain public interest they require responsive and flexible tools to craft engaging experiences and exhibits. Content should not be created redundantly or become obsolete with each application update. There should not be technology-imposed barriers to coordinating mobile, online and physical exhibits internal to an institution.

Distinctive creative vision, novelty, and experiential impact are all hallmarks of good museums and galleries. These critical strengths are also however not conducive to creating the foundational information technology substrate needed to support robust, coordinated, sustainable applications or systems. The Fluid approach and the Fluid Engage deliverables address this tension between unique creative or interpretive expression and usable, interoperable, reliable applications.

Museums and galleries are steeped in creative design talent. As museums and galleries move into the online, mobile and social networking realm, tools and resources to realize their design vision lag behind. Tools developed in-house are frequently not interoperable, poorly supported and fused to a specific design approach or exhibit. Applications built for the museum community in general have not given enough attention to flexible user interface design. Generic applications repurposed in museums and galleries do not address the unique needs of museums and galleries and are woefully lacking in user experience design and development features. Few applications have attended to interoperability and extensibility.

This project is an obvious and opportune confluence of strengths and needs between design-rich cultural institutions and the Fluid community which prioritizes and enables design in software projects. Through Fluid Engage we hope to bridge the gap between the creative intent and its realization in the digital realm by developing flexible, responsive tools and resources. These tools, applications and processes will also be future proofed or constructed in such a way that they can be easily updated to accommodate new platforms, design approaches, client devices and content formats.

You might ask why invest in this effort at this time when museums and galleries are struggling to keep the lights on and the doors open. The survival of museums and galleries is dependent on engaging visitors, establishing sustaining connections with these visitors and doing so in an effective, responsive manner. Museums and galleries have recognized that this time of fiscal restraint calls for collaboration and a collective effort. With the Fluid Engage approach each

institution can maintain a distinctive, unique identity and approach while taking advantage of pooled resources. Fluid Engage will create the framework that enables cultural institutions to pull together to collectively overcome the current threats to survival. The proposed project will help the museum and gallery community emerge from these difficult economic times far better equipped to effectively achieve their vision and mission.

Seamless Engagement

Fluid Engage will provide curators and visitor experience designers with a rich integrated palette of applications, tools and strategies to engage visitors, this will include:

- location-aware and context-aware mobile Web applications and services that address the visitor's personal mobile device,
- social networking tools and the ability to mash up or include new tools that emerge,
- a variety of interactive Web applications, templates and tools
- tools and applications to orchestrate interactive computer mediated exhibits in house, and
- authoring systems to create wayfinding and museum navigation applications.

Fluid Engage will work to enable seamless user experience scenarios such as the following, but more importantly numerous creative and as yet unimagined strategies to engage visitors and enable visitors to build new relationships with museums and galleries:

> In preparation for visiting the local art museum Theo checks the museum's web site. He searches for works by the Group of Seven, having recently toured the Canadian fall landscape where many of the works were created. He finds the works that correspond with his recent sojourn into Algonquin Park and uses the Web application to create a personalized tour of the museum. The tour covers the permanent collection, the special exhibitions and the visible storage. He downloads the tour onto his iPhone. While he is still on the museum website he checks to see if there are any forums or special interest groups on this topic. He discovers that there is both a blog and online forum on the Group of Seven. He subscribes to both. He finds an application that allows him to upload images he has taken of the Group of Seven landscape. There he discovers patron-contributed historical photos of Tom Thompson's landscape that match the current photos he has taken. He is able to link his photos to a Google map.
>
> When he visits the museum the tour he downloaded to his iPhone guides him through the museum collections and exhibitions. He is also able to query where the washroom and restaurant are and what events are scheduled in the museum. He can query the restaurant menu. At each exhibit or collection he can access supplementary information about the work, commentary by the artist, commentary by artist peers, interpretations by art historians, as well as perspectives and narratives contributed by other visitors. He can

query this data store to address questions that arise. The final stage of his tour is a large interactive wall display that is a collage of contributed images and audio commentary. His images are included in this collage. He is able to view the artist's works, images contributed by other visitors and his own images organized geographically or temporally. He can control the display using text messages and a Web application running on his iPhone browser. He is able to save and download a video file of the collage.

In the coming weeks he is alerted to events and special exhibits related to his area of interest. He also participates in the online forum which includes a lively debate about the social life of the original members of the Group of Seven. He shows his video to interested friends including a friend who has a collection of historic photos of the Rosedale Valley where some of the artists had studios. Theo arranges to visit the museum with this friend to view the collage generated from their combined contributions.

Fluid Engage as a Critical New Member in the Museum Application Domain

In designing the goals and deliverables of the project, the primary tasks of Fluid Engage have been referred to as:

1. the "glue" or the "mesh" that weaves together and enables communication between the disparate applications in the museum domain, as well as "mashups" of new applets, scripts and applications, and

2. the coalescing user experience layer

Fluid Engage will not "build yet another.." of any of the tools already available to museums and galleries. Rather Fluid Engage will create a substrate that enables museum designers and developers to create once and apply in multiple platforms and to enlist tools created in other contexts and apply a museum and gallery specific user experience layer.

Fluid Engage will work with and interoperate with open source tools in the domain, including CollectionSpace, Decapod, Omeka, Pachyderm, the emerging OpenExhibit and others. The project will also address interoperability with popular proprietary systems such as TMS, iPhone, Blackberry and others.

Why the Fluid Approach

In the process of preparing the application the project partners considered two approaches to addressing the challenge of providing museum professionals with the necessary authoring tools to create engaging user experiences: 1) a specific full featured authoring tool to be implemented by all museums and galleries planning to use Fluid Engage tools and resources, or 2) a toolkit of components, templates and modules that are compatible with and can be used in conjunction with any Web authoring environment deployed in museums and galleries. The overwhelming consensus of core partners and other museums and galleries consulted

(including the advisory panel) was in favor of the second approach. This approach is also completely consistent with the Fluid project approach to user experience design and development support. Among the advantages are:

- Greater longevity and responsiveness to changing technologies and curatorial approaches,
- Applicability to all sizes of institutions and technical expertise levels,
- Better support for a diversity of curatorial styles, users and contexts, and
- Greater extensibility and applicability across sectors.

Accessible Engagement

While there is legislation in most jurisdictions asserting and protecting the rights of people with disabilities to equal access to culture and public services, there is a great deal of confusion regarding the legal obligations of cultural institutions. How do you provide equal access to a Picasso painting for someone who is blind, to a Mozart sonata for someone who is deaf or to a highly physically interactive experience for someone who is paralyzed? Within the US, the Americans with Disabilities Act has specific titles that refer to cultural institutions, however these provide very little practical guidance. Recent legal settlements make it clear that "interactive and multi-media" exhibits are not excluded. The law requires "full and equal enjoyment" by patron's with disabilities. Not only is there general confusion regarding the requirements, accessibility is frequently dealt with as an afterthought, is rarely integrated into museum processes and while there are exemplary, innovative strategies developed they are not sufficiently embedded in the general IT infrastructure or processes to be sustainable.

- Fluid Engage will address these accessibility issues. The project goals with respect to accessibility are to:
- provide museums and galleries with the tools and applications needed to comply to legislative requirements with respect to computer mediated experiences and exhibits, whether online, kiosk based or through a mobile device,
- enhance the experience and engagement of all visitors through inclusive design,
- attract and engage the ever increasing number of individuals who experience a disability, including the growing number of seniors, and
- develop sustainable, integrated, cost effective means of providing equal access.

As an international center of expertise in accessible information and communication technology the ATRC is deeply embedded in the accessibility community and well positioned to achieve the accessibility goals. The ATRC is assisted by Clayton Lewis of the University of Colorado, who is an international expert in cognitive accessibility, and the Office of Learning Technologies at UOC, who have considerable experience in inclusive media design. The project will work with the US Access Board, consumer organizations such as the National Foundation of the Blind and similar arbiters of legal requirements in other countries to

develop tools and strategies that ensure equal enjoyment by people with disabilities.

The project will create a set of accessibility strategies that are sufficient to enable museums or galleries to comply with accessibility regulations with respect to computer mediated physical, online and mobile exhibits or experiences. For example tools to render delicate physical artifacts accessible to someone who is blind may include an curator authored audio description of the object that can be queried by the patron, a description that is created through a social network with multiple perspectives expressed, integration of systems to create physical replicas that can be manipulated or a digital haptic model that can be manipulated using a haptic device. As can be assumed, all tools and resources created through the project will meet accessibility requirements. The tools will also support and guide curators or other authors in creating accessible exhibits or experiences. The project will also create accessible wayfinding systems to assist all patrons in navigating the museum or gallery, including individuals who are blind.

These innovative designs will inevitably involve more than a single sense and enable interaction in a number of ways. This will undoubtedly make the experience richer and more engaging for all patrons. More explicit information about a painting or the ability to explore an artifact with your hands are experiences that many patrons desire.

Most importantly Fluid Engage will create an inclusive design framework that is sustainable given the constraints, realities and resources of an average cultural institution. Tools, components and toolkits will be created so that inclusive design becomes a naturally integrated part of "doing business."

Sustainability

In developing this proposal the project team has heavily referenced what has been referred to as the "graveyard of museum projects" as a sober reminder of the need to build in sustainability and learn from prior mistakes. This graveyard contains close to 100 mobile projects as well as numerous exhibit management projects. These examples have been used to determine what problems and weaknesses must be avoided or guarded against.

Speaking to museum experts with "skinned knees" the following failings or shortcomings have come up repeatedly:

- museums do not have sustained in-house support for technical staff and contract staff frequently have no ongoing commitment to the institution and frequently do not produce code that can be maintained or updated by others,

- museum funding is uncertain and support for a particular technology lasts only as long as the grant

- mobile projects have caused rampant content obsolescence, each hardware or platform upgrade made previous content incompatible and content had to be created anew

- many projects are based on a particular special purpose hardware platform which frequently goes out of production
- there is no support to update the systems to keep them compatible with current technologies
- most projects produce monolithic systems that duplicate other applications and create proprietary, poorly documented code that is dependent on the original developer for maintenance and updating
- many projects create unique, proprietary information models, vocabularies or ontologies and schemas that are not sufficiently extensible,
- many projects inflexibly commit to or "bake in" one file format, markup system, metadata schema or communication protocol and become obsolete when these diminish in popularity or are overtaken by more current protocols
- many projects impose one particular curatorial philosophy or are dependent on a single project leader or "evangelist" and are orphaned when that person leaves

The Fluid Engage deliverables are agnostic with respect to any particular content, interpretive philosophy or artistic approach. Thus the deliverables will not be threatened by inevitably changing trends or evolving approaches.

The tools and systems will be modular, highly reconfigurable or transformable, and optimally extensible to enable updating and adaptation to changing needs and technology. No style, information model, vocabulary or tool configuration will be hard coded into the deliverables. The mobile applications will not depend on a single hardware platform but will work across current platforms. Using the Web and nonproprietary development environments will ensure that the deliverables survive changes in popular hardware.

An agile, iterative design and development process will be applied. This will enable the project to change directions or adjust development technologies and approaches in response to the larger technical environment and to capitalize on popular technologies in any of the IT realms that are relevant to the project.

The Fluid Engage tools and resources will be highly interoperable with other systems and applications that exist or enter into the museum and gallery domain. Institutions will not need to choose between new enterprise systems and Fluid Engage applications as Fluid Engage will "play nice" with other systems.

The Fluid Engage project will be part of the larger Fluid community. The project will produce and implement UX components that will be part of the Fluid Component Library. In trying to pull together a team qualified to achieve the complex technical goals of the project it became apparent how "thin on the ground" experienced developers and software architects were in the museum community. The small group of technically experienced museum staff were completely overwhelmed with crisis management, Herculean efforts to keep projects

functioning or immediate deadlines with limited resources and almost impossible technical challenges. Thus the Fluid Engage team resorted to filling the gaps with university research and development units with prior experience in working with cultural institutions. Because of the heavy university involvement we were initially concerned that the project might be undeservedly viewed as the university community imposing its view of what was needed on museums and galleries (and a view tinged with technical triumphalism at that). To our surprise and relief this was not the case. On the contrary museums were relieved that a more technically well-resourced and experienced community would become involved in the effort and thus help to safeguard its sustainability. The project will adapt and weave together resources, tools and applications from the academic software realm thereby increasing the support base and the number of communities with investment in the applications.

Fluid Engage will collaborate with museum and gallery members from the beginning of the project. In the first year of the project Fluid Engage will develop a membership program for cultural institutions. The membership "value-added" will be participation in determining the design and development criteria of the project. Initial inquiries have confirmed that museums will see this as a valuable investment if Fluid Engage tools and resources can be used to provide sustainable open source methods of improving the user experience. Fluid Engage will also generate revenue following the grant period by providing a UX service to museums and galleries.

The highly knowledgeable and experienced Fluid Engage advisory panel will assist in iteratively reviewing the sustainability of the project. Fluid Engage will remain vigilant to avoiding problems encountered by prior projects.

Project Execution

Architectural Approach

The technology goal of Fluid Engage is to build an integrated system that supports the creation and use of rich, accessible museum exhibits and experiences. This system is dedicated to bridging the online, mobile, and physical spaces by enabling the use of services, data feeds, and user interface components in the authoring process. At the heart of the proposed architecture is an emphasis on creating tools that empower curators and museum staff to build innovative new experiences, and visitors to contribute back to the experience in diverse ways. By connecting the museum's existing information technology infrastructure with other web-based resources and social networking tools, Fluid Engage will provide a rich toolkit for visitor experience, contribution, and engagement.

The architecture is structured around a lightweight service approach, designed to provide easy ways to combine back-end systems, data feeds, and Web services into a coherent exhibit presentation. The goal is to create a system that is readily extended and adapted by museum tech staff and built with commonly used Web technologies. This will achieve interoperability

with the widest range of services and sources of information possible, while enabling the addition of new content types, services, and user interface components as the system grows. In effect, the architecture is intended to provide easy-to-use service-oriented tools allowing curators and museum staff to "mash up" exhibit content, Web resources, and interactive components.

The mobile environment is extremely diverse and is changing rapidly. It represents something of a moving target, with new devices and applications appearing on the market constantly. At this rate of change, the opportunities and risks are immense. There are a number of different devices, each with competing portions of the market share. Targeting each platform can be complex and time-consuming, ordinarily requiring separate code bases in several different programming languages. On the other hand, since cell phones and mobile devices are often replaced more frequently than desktop computers, their capabilities and stability is rapidly increasing, particularly in the case of Web access. Powerful Web browsers play a central role in all current smart phones, and a reliable platform for Web-based Ajax is finally available in the pocket of many museum visitors.

In order to deploy exhibits that can be used on a wide range of devices, our approach is to build Web-based user interfaces that are optimized for different presentation formats and modes of interaction. Thin native applications will be built to bridge the browser world with the specific device, with the user interface rendered using standard Web technologies to ensure cross-platform support.

This user interface architecture will be powered by Fluid Infusion, which provides a reliable and flexible environment for building and deploying Web-based designs that work across a variety of technologies and platforms. Infusion's development has been driven by concerns for accessibility and usability, and provides extensive support for customization and skinning. It blends seamlessly into existing web applications, yet allows end users to adjust the user interface according to their personal preferences and needs. In a service-oriented context such as Fluid Engage, Infusion brings with it the unique advantage of having been built expressly to support the complex environment of mash-ups and portals.

Fluid Infusion will be extended in order to support a wider range of platforms and devices, providing JavaScript framework code and reusable user interfaces that are well-suited to running on mobile devices. The Infusion Skinning System will be enhanced to include new styles that are harmonized with the conventions of the specific device being used, such as the iPhone Human Interface Guidelines and appearance conventions.

Reuse is a common theme throughout the Fluid Engage architecture. Fluid Engage will not redundantly create functionality or tools where an existing open source solution can be found. This will ensure greater interoperability, and will allow us to focus on solving the unique user experience challenges posed by the creation of exhibits that cut across the physical and online realms on a variety of devices.

Architectural Approach to Accessibility

Accessibility is deeply woven into the architecture and technology of Fluid Engage. Rather than apply accessibility solutions as an afterthought, Fluid builds upon sound accessibility principles from the beginning stages of architecting to the final touches, integrating our solutions into particular contexts. As a result, this integrated approach not only delivers critical accessibility features, but it also results in rich, genuinely reusable designs that can be adapted for different contexts and types of exhibits.

Infusion's accessible framework will provide the foundation for many features within the Engage architecture, including the ability to render custom user interfaces on mobile devices using the UI Options component and the Fluid Skinning System. The Web-oriented approach of Engage allows us to use emerging rich internet application accessibility standards such as ARIA (Accessibility for Rich Internet Applications) to create online exhibits that are both flexible and compatible with assistive technologies. Fluid has helped shape these standards within groups like the W3C while gaining in-depth experience using them in practice. We will apply this expertise to the web but also beyond, to the mobile realm.

Architecture Overview

The Fluid Engage architecture is structured into three main layers:

- The Services and Components layer provides the core building blocks for composing rich online exhibit experiences and sharing data across the system.
- The Authoring and Delivery layer includes the templates, user interface components, and scripts required to deliver Web-based content in a form that is most suitable to the device
- The Access layer consists of thin applications deployed on mobile devices, or standard Web browsers in kiosks and on the desktop, used to access and interact with the online exhibit

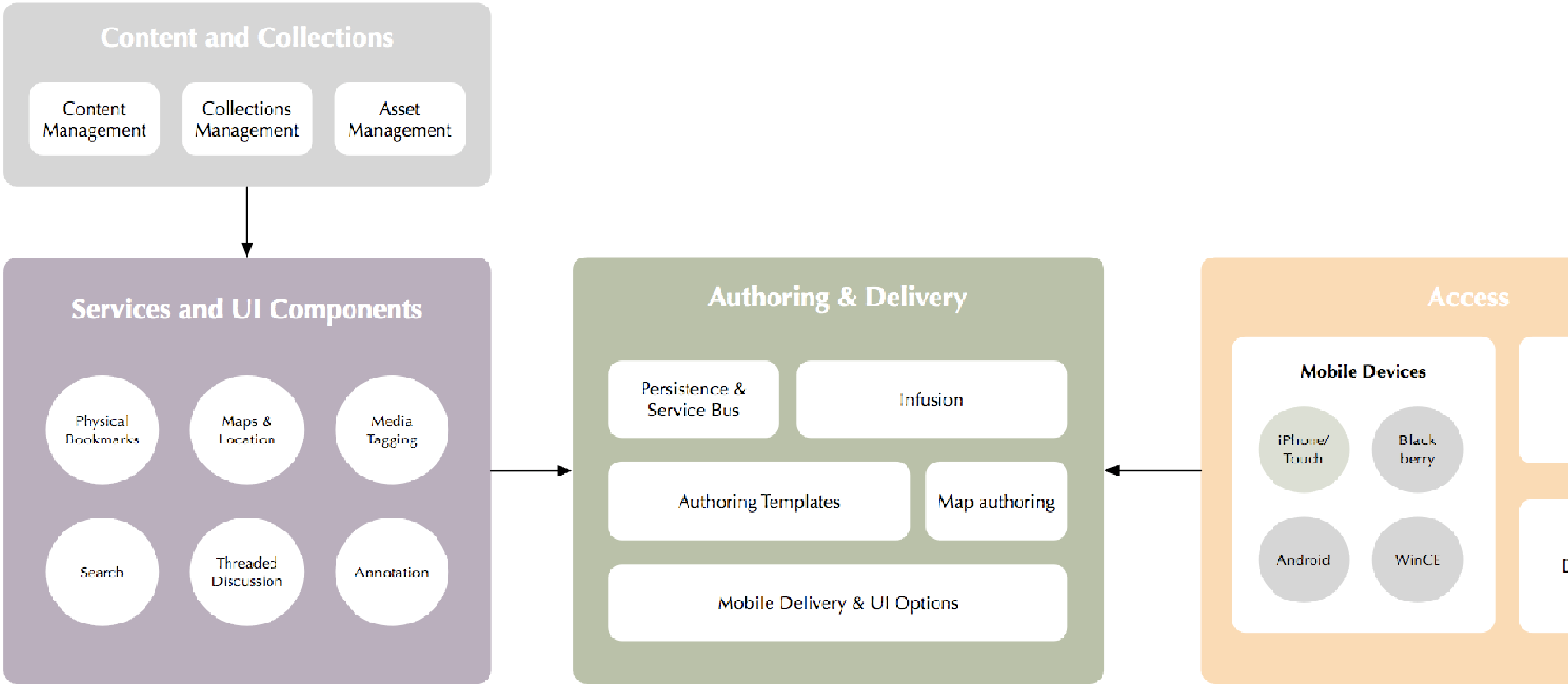

Figure 1: The overall Fluid Engage architecture, showing the relationship between the Content, Services, Authoring, and Access layers and their constituent parts.

1. Services and Components

The services and components layer provides a means to integrate data and resources from a variety of sources into a consistent presentation. All user interface components will be built using the Fluid Infusion technologies, taking advantage of the Infusion JavaScript framework to enable highly flexible and accessible user interfaces built with HTML, CSS, and Ajax.

The goal for the services is to ensure that they are easy to build and use by museum technology staff. As a result, the service layer will be built using REST and JSON as the standard way to call services and retrieve data. Another motivation for taking a RESTful approach is that it ensures there will be no additional parsing or marshalling overhead imposed when connecting a web service directly up to a JavaScript-based UI component. Infusion components are highly amenable to this style of development, and the approach will work easily across a broad range of technologies.

The Engage services themselves will be built using a single programming language, but will allow the reuse of existing services and tools most suited to the particular context, regardless of language. For services built directly, the declarative and dynamic scripting approach established with Fluid Infusion will be leveraged. This development approach emphasizes object oriented patterns and inversion of control to simplify the process of wiring up dependencies within the code. A likely programming language candidate for this is Ruby, along with the Merb/Rails 3.0 framework to enable rapid web service development.

This approach should be fairly accessible to a wide range of developers who may not be experienced enterprise developers. Fluid has built up substantial expertise in employing scripting-based languages in a scalable and maintainable manner, and Fluid Engage will work with museums to help ensure that they are able to build fast and effective solutions. Over time, this will also provide an opportunity to grow development capacity within the museums, while maintaining a solution that fits well into existing infrastructure.

2. Authoring and Delivery

The authoring and delivery layer consists of a number of client and server-based Web technologies woven together through the use of exhibit and activity templates. With this approach, authors can mix and match components, services, and templates as they see fit, working within the authoring environments that they are most familiar with.

Fluid Infusion will power the core of the user interface layer, providing UI components for each of the services provided within the authoring toolkit. Infusion will also enable the delivery of customized markup and stylesheets intended for specific mobile devices through the use of the skinning system and UI Options component.

Also included in this layer is a map authoring tool intended to assist museums in creating maps tagged with exhibit information and annotations.

3. Access

The access layer includes the technologies used to view and interact with the online exhibit. In the case of kiosks or desktop browsers, no additional code will need to be written to support these platforms. Mobile devices, however, require some additional development effort to be supported effectively.

Since location awareness will play a central role in the Fluid Engage architecture, access to the hardware will be

required to send information about the visitor's location to the map service. This will likely be implemented using 2D barcodes and the device's built-in camera. Support for the WiFi-based location tools developed by the ATRC's Smart Campus in Your Pocket (SCYP) project will be added as well.

Thin mobile applications will be built for each viable smart phone platform, providing a secure bridge between the Web and the device's hardware. All user interfaces will be rendered using an embedded web browser view, allowing sharing of user interface code across platforms.

User Experience Design Approach

Museums and galleries have no lack of design sensibility and creative talent. The deep frustration felt by curators and education directors when venturing into the digital realm stems from the extreme difficulty in realizing this design vision using current technologies. The applications, tools and platforms are not sufficiently responsive, flexible or yielding to the author's needs. Creative effort is distracted by low-level technical challenges. In particular with community or open source software, there is a conceptual disconnect between the developers of the tools and the creative staff at museums and galleries. At the same time, the incredible potential to address the diverse needs of museum visitors through computer-mediated exhibits and experiences is frequently not realized. This is in large part due to the awkwardness of the tools and lack of interoperability of the infrastructure.

Fluid Engage will develop systems that empower authors to realize their creative vision across the entire expanded domain of the museum or gallery. At the same time, the project will harness the potential of computer-mediated systems to address the highly diverse user experience (UX) needs in cultural institutions. This project is an obvious and opportune confluence of strengths and needs between design-rich cultural institutions and the Fluid community, which enables and prioritizes design in software projects. Through Fluid Engage we hope to bridge the gap between the creative intent and its realization in the digital realm through flexible, responsive tools and resources.

Embedding good user-centered design techniques into the development and authoring process is critical to accomplishing the goals of this project. The Fluid community has a commitment to improving user experience in web applications that will be carried into this project. By virtue of using Fluid components whenever possible and also building new components, Fluid Engage will benefit from the expertise, research, and designs that the Fluid designers have established as well as the creative input of curators. Additionally, the Fluid community will continue to be a champion of inclusive design, contributing thoughts and processes for inclusive design to the larger design community. Because this proposed project takes on distinct yet complementary spaces in the museum (physical, online, and mobile), the design team will do extensive work to create designs that bridge these spaces, making sense of it to the user.

In attempting to address a number of unique challenges associated with distributed community source projects and inclusive design the Fluid project has pioneered a new approach to user experience design. Among the challenges addressed are: a distributed design and development team, an agile development process, the lack of a single configuration, an extremely diverse set of users, and a transformable, personalizable user interface. This agile, participatory and innovative approach to user experience design and usability testing will also be implemented in Fluid Engage.

By reusing the products of the Fluid 2007-2009 project in Fluid Engage, we will benefit from a rich, customizable, and accessible user interface layer. The design team will emphasize a seamless experience by creating clear and consistent interfaces across all components and templates within the Fluid Engage toolkit. Linkages and resource pooling will be facilitated between the museum and gallery community and the academic community engaged in the initial Fluid project. Design patterns, personas, scenarios, and other UX resources will be shared across software projects collaborating with Fluid.

UX for authoring toolkit

At the heart of the Engage authoring toolkit will be a set of useful exhibit and activity templates built with user-centered design techniques. Curators can use and adapt these templates to easily construct exhibit web sites and interactive activities that will work on the web, mobile devices, and kiosks. These templates will help curators organize and present their objects in meaningful ways by collecting together relevant Engage services, UI components, interactive activity scripts and other useful resources. This layer is where the power of a usable, skinnable, and customizable interface is most clearly demonstrated.

UX for services

As museums start to connect their data infrastructure and reach out into social networking services and interactive activities, they find themselves squarely in a place where UX inconsistency becomes a problem. The Fluid Engage services will tie together extant enterprise solutions with the Fluid authoring toolkit. Designers will help provide a consistent look and feel through use of Fluid components and the Fluid Skinning System. These solutions will allow users to customize content to fit local branding and style needs. The UX team will also endeavor to ensure that all user interfaces maintain a seamless experience when plugging in new services.

UX for user interfaces (web, mobile, kiosk)

Ultimately Fluid Engage intends to provide an interactive, engaging, and extended experience to the public in and outside of the physical museum across the three spaces that museums use to engage visitors: the mobile, the online, and the in-house physical space.

In the Mobile space, the design team will conduct background research in various mobile platforms to learn about the interaction conventions used with each device. This research will help design a mobile application that is fully integrated, looks and feels like a native application, uses a consistent key convention, and responds to the native interaction techniques. Use of these conventions, such as pinching and flicking on the iPhone, will help reduce the users' learning curve and allow them to start using and enjoying the services immediately. The mobile application can be used both in and outside of the physical exhibit space. Inside the museum in particular, visitors will be able to use their own handheld device to guide them through the space and access location-based content and search capabilities. Visitors will also share their experience and feedback by geo-tagging and commenting as they enjoy the exhibition, which will promote social interaction between visitors and enrich user-generated content.

In the Online space, the design team will work on creating a Web experience for visitors before and after (or independent of) a visit to the museum. Visitors will be able to access rich content relevant to the exhibit or in-house experience, such as the geo-tagged floor plan, to virtually explore the exhibit space and plan their visit. Visitors will also have easy access to other resources including the museum's CMS, audio tours, and the Web at large either directly embedded within or linked from the online application.

In the Physical space, the design team will work with kiosk technologies to deliver the same seamless, rich experience of the other two environments guided by the museum visitor's needs and interests including the needs of visitors with disabilities.

UX Outreach

Fluid Engage will help to bridge the gap between open source development communities and museum and gallery software users. To effectively reach out to other open and community source projects applicable in cultural institutions, the Fluid Engage design team will continue to attend "unconferences" where team members

will teach software developers how to conduct user testing, how to design in an agile development environment, how to work closely with designers, etc. The group will contribute to a blog, writing about notable design activities and lessons learned. The Fluid Engage team will also attend museum community conferences, presenting methodologies and processes for effectively realizing design plans in the digital realm. The designers will bring attention to the work being done in Fluid Engage, soliciting volunteers and a larger design conversation about best practices.

Persona and Scenario Library

Through frequent and open conversations with potential users (curators, educators, etc.) at various institutions, the Fluid Engage UX team will build a strong set of personas and scenarios to understand and support the work that goes on at the institutions while creating user experiences. Direct contributions from the community of cultural institutions will be encouraged. This collaboration will provide an opportunity for the designers on Fluid Engage to learn about the needs, goals, contexts, and behaviors of users and to make informed design decisions. To situate the work that Fluid Engage is conducting, the design team will construct museum personas and scenarios to reflect the perspectives of curators, integrators, media specialists, and museum visitors. These personas will be contributed to the Fluid persona library, adding the context-specific activities expected from various users of the workflow. These personas are wholly reusable by the community. They will be openly available for other projects to take advantage of.

OSDPL community participation

Fluid has built, and is contributing to, the Open Source Design Pattern Library (http://osdpl.fluidproject.org/). This resource is an open community of designers and developers who come together to share design patterns of commonly experienced interactions and behaviors. The Fluid Engage project will continue to grow this community and resource, contributing patterns from any new components that are built.

User Testing and Iterative Design

The Fluid team is committed to doing extensive user testing early and often. The same practice will be brought into the Fluid Engage project. The team will produce usable designs early and often for user testing and then use the feedback from that user testing to iterate on the designs, refining them to progressively improve the design. One important criterion will be the capability of the application to transform to meet the diverse needs of museum professionals and visitors.

Specific Project Deliverables

Specific project deliverables will include:

1. A visitor-experience authoring toolkit that:
    - allows curators to integrate the authoring of mobile, online and computer mediated in-house experiences and exhibits
    - interoperates with digital collection management tools, including CollectionSpace and other systems
    - integrates and enhances other open source digital curation tools and content management systems
    - provides authoring supports and design guidance for online, mobile and in-house interactivity, including templates and UI components

- supports the creation of accessible and usable exhibits and experiences through linked-in accessible components, evaluation and repair utilities and user experience resources
- can interoperate with common educational environments such as learning management systems and curriculum or learning object repositories
- supports the creation of content and interactive activities that will work on common handheld devices
- makes it possible for curators to provide personalized museum experiences that extend to the online and personal mobile device environment.

2. Supports for creating social networking experiences, and extending the engagement of visitors (with the museum content and other museum visitors) beyond the visit of the physical museum or gallery to engagement in special interest groups and mobile or Web based research tools. This will include supports for gathering and managing content from the public.
3. An accessible location awareness toolkit to assist museums and galleries in creating maps and wayfinding systems that can be used by individuals who are blind, visually impaired but also by all visitors. This will incorporate tagging systems and enable location annotation by museum and gallery patrons.
4. A UI component library that addresses common UX issues in computer mediated exhibits, online museum and gallery spaces and mobile device environments.

Authoring Toolkit

Map Authoring and Tagging Tool

The map authoring tool will guide museum staff through the process of bringing in their web-ready images and tagging them with objects and locations of interest. The tool will also allow authors to add accessible audio descriptions to key areas on the map. The map authoring tool will provide the following features:

- Web-based component using the Fluid Uploader and Canvas element for image rendering
- The ability to import web-friendly images (eg. in SVG or PNG format)
- A means to tag the locations of objects on the map, and connect them with references to the collection or CMS
- Tagging other items of interest in the space
- Tags can be text, image, or audio-based
- The ability to record and add audio descriptions or other accessible alternatives
- User-contributed location tagging

Engagement Authoring Toolkit

The authoring toolkit will provide a means for museums to build exhibits and interactive activities that extend across the online, mobile, and physical spaces. It will enable curators and museum staff to pull in information and resources from a variety of sources both within their institution and from the Web at large. The toolkit will include useful templates and resources for museums, providing exemplars of compelling online exhibitions and activities that are highly usable and accessible. These templates will be built collaboratively by interaction designers, curators, and other museum web experts.

The toolkit is intended to be compatible with a variety of content management systems and authoring tools. It will be built using HTML, dynamic scripts, and Fluid components backed by the Engage data integration services.

Examples of templates that may be included in the authoring toolkit include:

- Exhibit Overview: provides a structure for organizing and leading users into the exhibit and associated curatorial material
- Object Gallery: displays a gallery of media thumbnails and brief information, allow users to browse the exhibit
- Object Detail view: provides detailed information and links to more information about an object, and
- A variety of interactive activities constructed such that they can be restyled and repurposed for alternative content.

Location-Tagged Audio Tours

Museums often have a wealth of existing audio resources and tours that they want to bring online, and there is great potential for new types of audio resources that can be linked to the location services of Fluid Engage. The audio support in Fluid Engage will include:

- Ability to add audio to locations on the map, providing map-driven audio tours
- Delivering audio in mobile-device friendly form that can be easily browsed

Services

Map and Location service

The maps and location service will provide a simple Web API for determining the location of objects and people within the museum. Initially, the project will implement a 2D barcode-based solution, but other location services will also be developed or integrated.

The map and location service will be responsible for providing devices with appropriate maps and coordinates within the space. Long term, the goal of this service is to remain agnostic to the particular means of determining position. Specific positioning strategies will be pluggable, allowing for different methods based on an institution's needs. The features of the service will include:

- A common API for querying location
- The capacity to return normalized coordinates relative to maps created in the map authoring tool
- The option to extend the service to support finding friends or experts in the space, in coordination with the social networking services

Search service

The search service provides an API for finding information related to objects using free-text queries. It will

provide users with well-organized search results for information both within the institution's collection and out in the Web at large. This service may be extended to provide federated search support using standards such as OAI in the future. The search service will provide a common API for searching within the museum's collections and content management systems as well as the Web.

Integration Services for Collections Management Systems/Databases

The museum's collection and associated asset management and content management systems provide a rich source of information for creating online presentations. The Fluid Engage toolkit and services will provide the user experience layer for these systems. In order to deal with the diverse CMS and database systems used within various institutions, a set of web services will be built to provide a common API for accessing information within these systems. Versions of these services will likely be implemented, if they don't already exist, for CollectionSpace and TMS, or other collections systems as needed. Borrowing heavily from the model being pursued in parallel on the CollectionSpace project, the CMS integration services will include:

- Object search, providing the ability to search content with the collections management system or other sources of object information
- Object identity service, providing unique identifiers for an object (such as an accession number) that can be used throughout the Fluid Engage system
- Object relationships, a means for querying common relationships for objects within the system, in a domain-sensitive way (eg. for art: period, movement, style, artist, medium, etc.)

Social Networking Services

The social networking services in Fluid Engage will provide new ways to engage visitors, bringing the ability to discuss and contribute back to the exhibit. Services and user interface components will be combined to easily allow authors to include tagging, discussions, and annotations alongside exhibit content itself. In every case, popular existing tools will be leveraged such as WordPress rather than building redundant infrastructure. If requested by museum implementers, other services may be built to connect with common social networking sites such as Facebook, Twitter, YouTube, and Flickr. With the goal of broad interoperability, the OpenSocial APIs will also be used extensively for these services where possible. Initial service development will focus on physical book marking and the ability for users to capture objects in a personal collection that can be referred to later.

Other services may include:

- Annotation/"My Story:" the ability for visitors to share their stories and experience of the object
- Discussions and threaded comments, allowing visitors and museums to engage in dialog about the exhibits
- Media tagging: the ability to annotate exhibit pages or the map with audio, video, and text-based tags
- Blogging
- Chat
- Connectors to social networking sites such as Facebook, Twitter, YouTube, and Flickr

Data Model

The core data model will provide the definition of the core entities or "interesting things" for all services and APIs within the proposed system. A consistent data model is at the heart of successful interoperability, and in every case the project will aim to reuse existing models from projects such as CollectionSpace, Omeka, OpenSocial, and more. Model objects will consist of:

- Collections (reused from CollectionSpace where possible)
    - Objects
    - Accession numbers
    - Relationships
- Exhibits (reused from authoring tools where possible)
    - Collections of objects
    - Pages
- Social networking (compatible with OpenSocial)
    - People
    - Friends
    - Activities
- Content and Contribution
    - Comments
    - Threaded Discussions
    - Ratings
    - Tags

User Interfaces (mobile, web, kiosk)

Mobile Apps

Fluid Engage will build a platform that can easily be used by museum visitors on devices they already have in their pocket, such as smart phones. With this, visitors will be able to connect with the online exhibit presence while in the physical museum space, contribute to blogs or other conversations, and find more information about objects. Location awareness will allow for spatial tagging, enhanced audio tours, accessible audio descriptions, and wayfinding.

One important consideration is that the mobile market is highly fragmented and growing at a fast pace, with new devices coming out on a regular basis. In order to build a system that will be relatively future-proof and will work on a wide range of handsets, the approach leverages Web technologies to provide a cross-device platform. User

interfaces will be rendered using Fluid Infusion, a JavaScript-based framework and library of components that are highly flexible and skinnable. Fluid Infusion's skinning system will be extended to provide user interfaces that are tailored to the conventions and input methods of the device.

In order to provide location-awareness, the team will need access to the device's native interfaces. To accomplish this, the team will build small native phone applications for popular devices, starting first with the iPhone. This will be implemented using the open source WebKit browser, along with a JavaScript bridge used to access the camera, WiFi, and Bluetooth. A number of open source projects have also taken this strategy for supporting multiple devices, and libraries are being written to enable applications that can be deployed on iPhones, Blackberries, and Android devices. The project will likely reuse and contribute back to a community such as PhoneGap to establish this cross-device compatibility layer for Fluid Engage that:

- Embeds a WebKit or Gecko view in which the vast majority of the UI is displayed
- Bridges device-specific APIs for camera, WiFi and possibly Bluetooth into JavaScript APIs available to the Web interface
- Stores user preferences and shares them with the web application and exhibit presenter
- Offers Fluid Infusion themes that provide device-specific styling and UI affordances for the web application

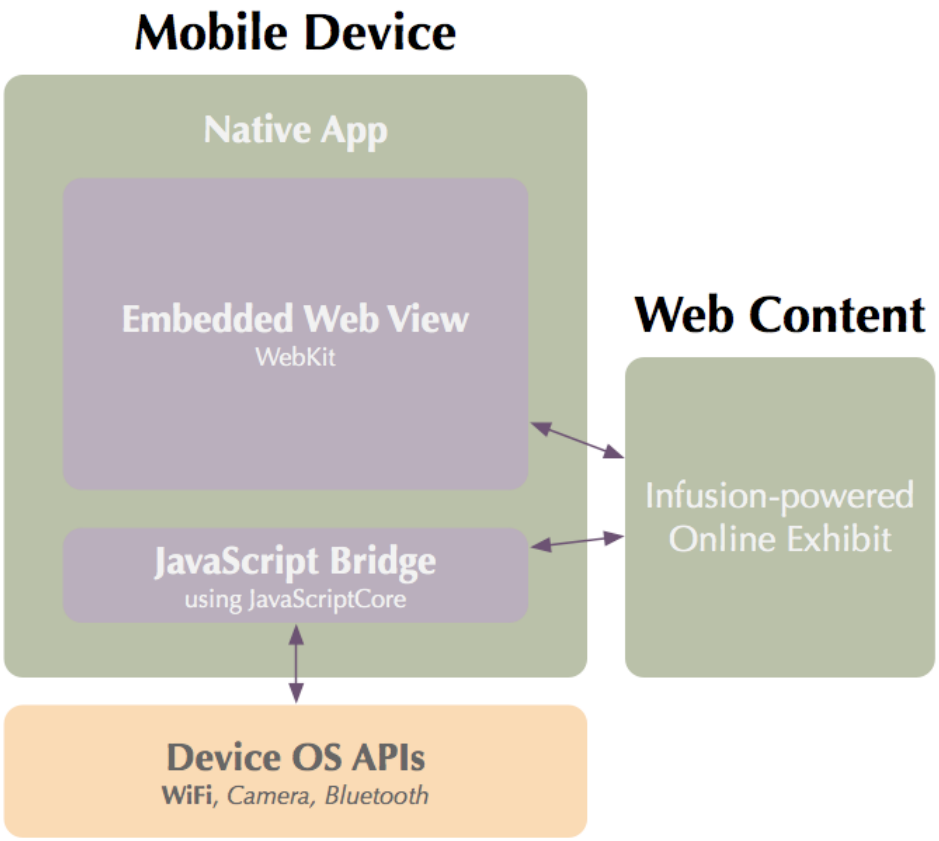

Figure 2: Illustration of the embedded web browser strategy for mobile device deployment.

Exhibit Presenter

The Exhibit Presenter application is responsible for delivering online exhibits authored within the Fluid Engage authoring tool to a variety of devices. Extending upon Infusion's UI Options and skinning system technology, it will deliver the online material in the way that is best suited to the user's preferences and the conventions of the device. It will also provide navigation and views on commonly-used services such as search and location queries. The Presenter:

- Delivers a unique user interface tailored to the device (eg. phone, kiosk, desktop web browser)
- Provides a view on end-user services such as search and location
- Orchestrates the workflow of delivering and interacting with an online exhibit

Weaving the System Together

Fluid Engage is a rich composition of services, data feeds, authoring tools, and user interface components. At the same time, the goal is to provide a seamless and integrated experience for museum professionals and visitors alike. At the heart of the proposed architecture are ubiquitous Web standards, such as HTML, CSS, JavaScript, and REST services. Fluid Engage will be woven together into a seamless experience using the following approaches:

- Leverage web presentation technologies such as HTML, CSS, and JavaScript to deliver a user interface that will work across browsers, platforms, and mobile devices
- The Fluid Infusion framework, skinning system, and library of components will provide support for rich, accessible, and customizable user interfaces
- Build web services that can work across technologies and will be simple to add and extend: REST will be used where possible

Each service in the service layer will be accompanied by a series of Fluid UI components, which provide carefully designed views on the underlying service. These components can be easily attached to a data feed from the service and used to display information for a variety of contexts or experiences. The authoring tool will provide a means for exhibit authors to "wire up" services and user interface components into a consistent overall user interface.

For each deliverable, we have attempted to identify and reuse existing open source solutions, expanding upon them as necessary to provide a highly usable and accessible solution.

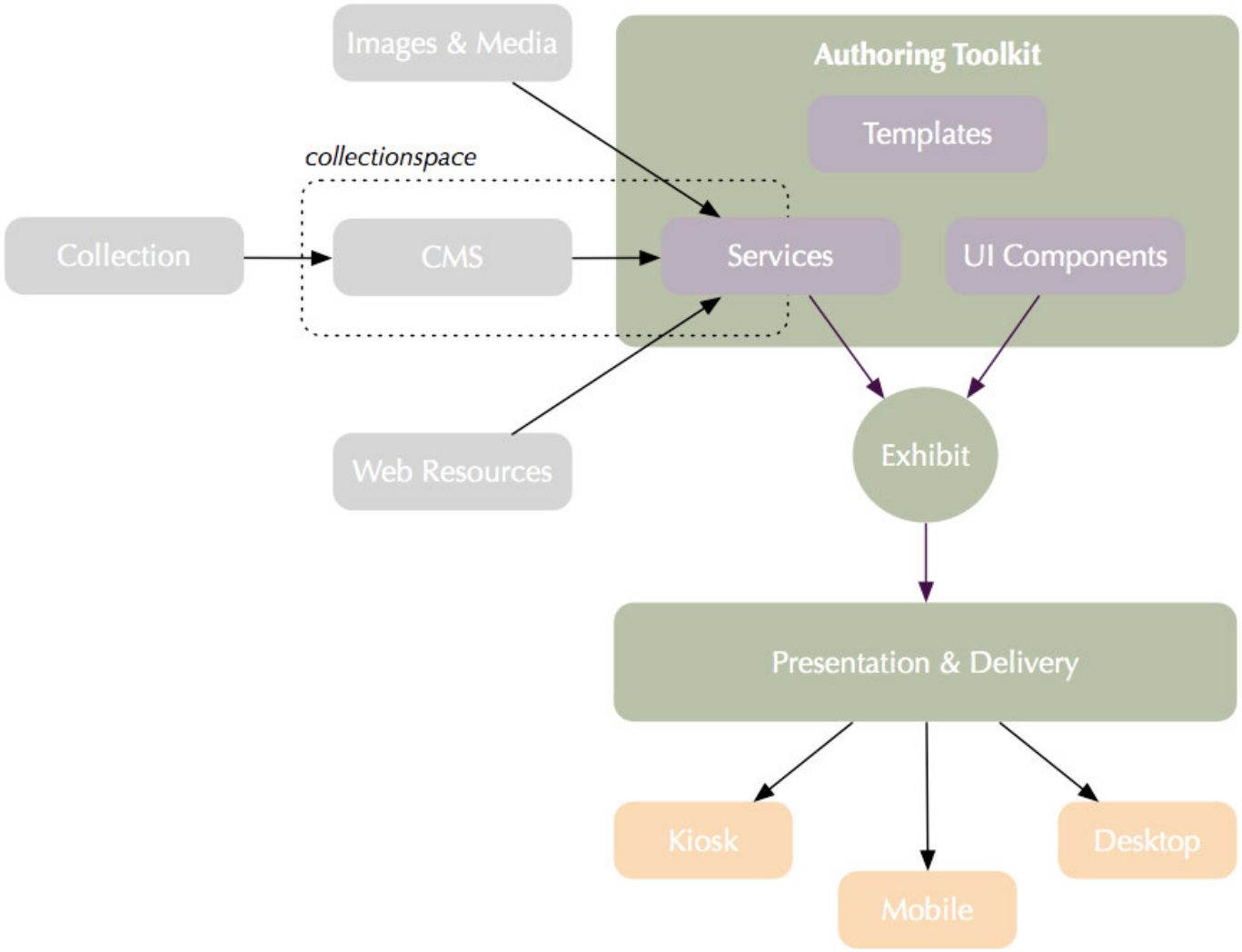

Figure 3:The authoring workflow architecture, showing the process of authoring online exhibits by composing a variety of services, data feeds, and UI components

Summary of Phase One Project Deliverables

The following is a summary of the project deliverables to be accomplished in the first phase of Fluid Engage from April 2009 through March 2010 and included in this funding request.

Comprehensive Accessibility Strategy

- Create an accessibility strategy that addresses accessibility concerns and obligations with respect to Museum and Gallery visitor engagement through the Web, mobile devices and computer mediated in-house exhibits
- All deliverables will also be fully accessible
- A set of tools, resources and guidelines to support museums in meeting their legal obligations

User Experience Support

- Fluid Engage will create and provide an ongoing resource community to advance and support user experience design in museums and galleries with collaborative links to existing collaborative museum initiatives and the academic community
- Community outreach strategies
- Recruit additional cultural institutions to become part of this community

Creating support for a contributing community

- create all the supports needed to recruit, enable and support contributions of components, templates, mobile strategies, accessibility strategies from the greater museum and gallery community
- capitalize on the Fluid community and contribution supports
- engage directly with those building successful solutions to integrate and build upon these successes.

Map Authoring

1. Web-based application
    a. using Fluid Uploader and Canvas element for image rendering
2. Allows user to upload web-ready map images and tag them (evaluate use of Steve)
3. Pin point the location of objects on the map and add information about them:
    a. Image thumbnail
    b. Name, brief description, other metadata

Data Integration Service

- Defines a simple data model for objects and exhibits (shared with CollectionSpace, perhaps Omeka)
- Provides a consistent API for accessing objects from a Collections or Content Management system
- Assume that data is only lightly structured, but still useful and in a form that can be relatively easily exposed via this service
- REST-based
    - eg. GET Object (by id, name, relationship)
    - Data exchange using JSON and plain old HTML

Mobile Support

- Focus on one mobile platform to start: iPhone
- Follow up with second platform: Android or Symbian S60 (since both provide a first-class WebKit environment)

Location Awareness

1. Simple camera-based positioning
2. Take a snapshot of a 2D barcode on a sign
3. Location awareness service resolves barcode images into objects
    1. RESTful service: POST image, response is object ID suitable for lookup with data integration service
4. Camera-based approach opens up the potential for "graceful degradation" on less sophisticated devices
5. Groundwork for early WiFi proof of concept in round one and potentially adding on Bluetooth-based positioning in the second round

Search Service

- Simple text-based indexing
- Likely powered by Lucene/Ferret or similar technology
- Plain text indexing, with simple user defined keyword searches
    - Object name, artist/creator/culture/region, year/period, style/classification

UI Components

- Map navigation component
    - See the locations of objects on the map
    - "Object quick view:" at-a-glance summary of the object
    - Links to detailed object views
- Object bookmarking ("My Museum") component
    - Ability to bookmark objects for later viewing
    - Quick bookmarking: "save this for later"
    - Organize and tag saved objects
    - View bookmarks and link to detailed object views
- Search component
    - Plain text search
    - Display search results

Exhibit and ActivityTemplates

- A small collection of useful and broadly reusable exhibition pages:
    - Exhibit Overview: provides a structure for organizing and leading users into the exhibit and associated curatorial material
    - Object Gallery: displays a gallery of media thumbnails and brief information, allow users to browse the exhibit
    - Object Detail view: provides detailed information and links to more information about an object
    - Content-independent, restylable interactive activities
- Assembled with fully-accessible Fluid components, backed by data integration services
- Powered by Infusion renderer, Fluid Skinning System, and simple set of reusable Ruby or PHP scripts

Phase I and Phase II of Fluid Engage

The Fluid Engage project is divided into two one year Phases. This proposal requests funding for the first phase of the project. As described above the project plan and deliverables for this first phase are constructed to create a demonstrably useful toolkit, the technical foundation for pooling resources and model implementations in the first year. The authoring toolkit and associated resources produced in the first year will address the in-house, online and mobile user experience. The first phase will also address the goals of accessibility, wayfinding as well as the interoperability of museum applications. This first phase will have a very aggressive timeline for creating museum implementations enabled by a development approach that produces usable components early on.

Phase two of the project will expand and advance these deliverables, adding components, activity templates, additional platforms, devices, types of interaction and most importantly additional implementations in a broader range of museums and galleries to evaluate, refine and demonstrate these deliverables.

Phase II will include:

- Richer searching and indexing, better relationship awareness
- Deeper object/exhibit data models based on CollectionSpace
- Generalized maps and location awareness services
- Expanded map authoring tool including workflow from CAD drawing import - final, interactive maps
- Further build out of automatic position detection using WiFi or Bluetooth
- Support for more mobile devices: Blackberry, Windows Mobile
- Expanded social networking and user contribution services:
    - "My Story"
    - Threaded discussion
    - Connections with third-party social networking sites
    - Richer tagging support (incorporating Steve work)
- More and varied exhibit and activity templates and scripts

Project Plan and Schedule

Because Fluid Engage is building upon a team that has already been actively producing Fluid components, the project will be able to "hit the ground running" in the first quarter of this project. The project will need to train new team members and develop new ways of working together within a different structure, with different leads, and with an already active community. The approach will be to build early usable prototypes that will be implemented in creating exhibits and experiences in the museums and galleries early in the project. This approach will assist in gathering useful feedback early so that the team can iterate on and improve the solutions. The project schedule is designed to build upon simple and then increasingly complex solutions, allowing the team to coalesce before diving into more complex solutions. Additionally, the core team will be doing activities in the first quarter that will be familiar to Fluid team members who have been on the Fluid 2007-2009 project. The activities are intentionally front-loaded, building on existing solutions to enable an aggressive implementation plan for iterative refinement.

The first year or Phase I of the project will be divided into four quarterly phases as follows:

April-June 2009: Exploratory Phase	July-Sept 2009: Maps and mobile	Oct.-Dec. 2009: Implementation	Jan.-March 2010: Templates & API
Team building & site visits	Preliminary service API	Object bookmarking service and components	Pair up designers to work on exhibit and activity templates with mini-grantees
Data and service inventory	Testable mobile app prototype (iPhone)	Refinements to map authoring tool	Solid API for services and components
UX research with museum curators and staff	Map authoring tool & implementation; begin map/audio tie-together	Search service and components	Mobile app prototype running on another platform
Architecture sketches	Design & implementation of early authoring templates	Refinement of data integration services	Museum data integration implementations
Wireframes for map	Prototype data integration	Coordinate	Ongoing community

authoring, navigation, and mobile app	and search services	implementation mini-grants	vision & roadmap

Table 1: Technical Schedule Year 1

The second Phase of the project is projected to include (not part of this funding request):

April-June 2010 Services and Tagging	July-Sept 2010 Tie-together	Oct.-Dec. 2010 Mobile spaces	Jan.-March 2011 Ongoing community development
Improve searching and indexing	Deeper object/exhibit data models based on CollectionSpace	continue Content & CollectionMS integration	
Generalized map and location awareness services	Expanded map authoring tool including workflow from CAD drawing import - final, interactive maps	Further build out of automatic position detection using WiFi or Bluetooth	More and varied exhibit and activity templates and scripts
Social networking and user contribution services	mobile prototype for new platforms	Support for more mobile devices: Blackberry, Windows Mobile	refinement of documentation, tools, resources
Richer tagging support (incorporating Steve work)	Threaded discussion	Connections with third-party social networking sites	wrap-up of institution implementation; more implementations

Table 2: Technical Schedule Year 2

Expanded Year 1 Quarterly Deliverables

The following section provides an expanded description of the deliverable schedule presented in Table 1.

Q2 2009	<u>Community</u> • do team building as early as possible with site visits • gather basic info (inventory) from museums about their infrastructure and enterprise solutions • talk to museum professionals (user analysis) to identify pain-points

	architecture • sketches to structure the work of the project as a whole (in particular authoring and services early on): focusing on data import and search
	mobile • planning and early sketches on one platform
	maps • take web-ready map and work it into early web app prototype • social networking • conceptual work; tie-in with architecture services sketches • authoring resources • begin templates from idea to development in this quarter: planning, scoping, to coding.
	UX • build up to wireframes of map presentation • do early designs of components coming out of map/web work for pick-up by developers in Q4 2009 • work on mobile designs for one platform • identify components and roadmap them out for build: focusing on mobile and authoring templates
	output: • sketches of architecture (services, authoring, web solutions); early UX work on maps in particular; UX planning for building out components for authoring and mobile; a sense of what communities we need to integrate solutions for (ContentMS, CollectionMS, DB, etc.); early mobile sketches
Q3 2009	Community • regular sharing and check-ins of work; plug-n-chug workflow
	architecture • deliver preliminary API and implement with early museum use-case
	mobile • testable prototype with basic functionality
	maps • do implementations of map solution in early museum use-case; tie-together with existing audio solutions for early audio tour integration
	social networking • look for low-hanging fruit for integration into services • authoring • early implementation in museum use-case
	UX • continue component work (continue to refine work on map design with feedback and user testing with early adopters) • focus on mobile and authoring here (second mobile platform early work)

	output: • early implementations; early exhibit authoring templates; early map example; mobile prototype - basic map authoring tool - component(s) for displaying maps and information - native mobile app - early tie-in with audio tour - some exhibit & activity templates - an early exhibit web site
	First Six Month Deliverable Sketch: April-Sept 2009 April – June Map creation - not factored as a service, just image editing (desktop and mobile) April - June Data inventory + preliminary service API April – July Tag it with objects - couple of map display components - map + quickview July - Sept. Preliminary data import/search indexing July - Sept. Render it on web and mobile - iPhone July - Sept. Integrate museum audio materials with map/mobile July - Sept. Decide on implementation mini grants; adjust priorities accordingly; build out from early implementations June/July Bring team together for a working meeting in Toronto
Q4 2009	Community • continue to work closely with museum partners and ensure project is engaging with the broader open source community and the cultural institution community; preparation for coordinating and executing mini grants
	architecture • services: search and social networking + tie-in with CMSs
	mobile • continue to refine the prototype, integrating it with social networking work; work on second platform
	maps • continue to work with museums to build additional functionality into map (tie-in with services + early interaction (bookmarking))
	social networking • focus on low hanging fruit for integration into map and mobile in particular
	authoring • focus on building out authoring templates that capture an abstracted solution rather than a cookie-cutter and work in the component work from the early design work on map/web
	UX • continue to work toward design solutions that compliment the deliverables (i.e. mobile, map, authoring templates)

	output: • couple of social software hooks, more design on authoring tools and templates; more mobile work (second platform); more component work (tie-in with early work) • begin to tie-it-all-together (services > authoring > map > mobile + web)
Q1 2010	Community • manage mini grants and work coming out from that -- manage expanding and contracting of team as the mini grant work continues
	architecture • solid API
	mobile • roll-out mobile solution to museum partner
	maps • tie together with social networking
	social networking • tied in with services to be used for maps and authoring
	authoring • tie-in with services plus multiple implementations with museum partners
	UX • pair up UI and UX designers to build out multiple templates in consultation with museum partners/mini-grant awardees
	output: • multiple authoring template implementation examples, mini-grant implementation work, further tie-together of social networking with services (search and index) plus build-out to platforms (web, mobile ((authoring)).
Second half deliverables: Oct 2009-April 2010	Oct-Dec Ability to "bookmark" items from map into a "save for later" - service + component Oct-Dec Search service + components Oct-April Mini grants: implementation; real exhibits powered by Engage - templates as a deliverable from mini grants - pair the UX and UI resources of the community up to create generalized exhibit and activity templates Jan-April Templates (see above)

Integration of existing Community Source work

Fluid is committed to making use of solutions already in the public domain that contribute toward the goals of the project. Fluid Engage will work with these communities to incorporate additional features and functionality to benefit both communities. Additionally, Fluid Engage will build upon existing collaborations.

Open Social

The project intends to use OpenSocial APIs extensively for integrating the social-software services where

possible. This will allow Fluid Engage to readily plug in popular social networking tools like Facebook, Twitter and others. Additionally, it will connect the proejct into a community that is actively committed to keeping APIs up to date and available for new tools. Using OpenSocial will allow Fluid Engage to maintain a pluggable platform, making extensibility as easy as plugging in a new application.

Omeka

Fluid Engage will work closely with the Omeka team at George Mason University. Tom Scheinfeldt of Omeka is a member of the Fluid Engage advisory panel. The Fluid Engage toolkit will be compatible with Omeka and Omeka combined with Fluid Engage will be one of the authoring choices available to museum or gallery professionals. This is particularly attractive to smaller institutions without extensive technical support. Fluid Engage we will work with the Omeka community to enhance the application's user experience by integrating fully-accessible Fluid components. This will allow the project to easily build hooks into the collections management system (or "Services" layer). Architecturally this collaboration if facilitated by the fact that Omeka makes use of the jquery libraries enabling the integration of fully-accessible Fluid component solutions.

OpenExhibit

Fluid Engage will also collaborate with OpenExhibit, sharing deliverables and tools where appropriate. OpenExhibit will focus on science and technology museums while Fluid Engage will concentrate on arts and culture museums, but both will ensure that the tools created can work across the entire museum landscape. Jim Spadaccini of OpenExhibit is a member of the Fluid Engage advisory committee.

Leveraging Fluid 2007-2009 and Collection Space

Fluid Engage will make use of existing solutions from Fluid in addition to the work that is being completed in the Collection Space project.

All of the Fluid Project solutions will be relevant to and will be incorporated into the deliverables for Fluid Engage. The existing components will go directly into the authoring tool, allowing curators to easily upload, reorder, and otherwise manipulate content into easy to use templates that will be delivered through the web application layer to various devices. The Fluid approach to building reskinnable workflow solutions will be applied in the web application work in Fluid Engage. Fluid's approach to user preferences will be heavily used for the different presentation layers in Fluid Engage. In many ways, the workflow solutions and tools in Fluid Engage are implementations for the Fluid solutions as well as the Fluid methodology for building flexible user interfaces.

Fluid Engage is a culmination of the Fluid Project work, situating the solutions that have been built into the particular context and theme of the cultural institution. The core value and goal of Fluid will continue to be actualized through Fluid Engage as we continue to build rich, reusable, accessible and customizable user interface components.

An additional area of convergence is with the Collection Space project, a Mellon project building a community source collection management system. The Collection Space project has Fluid designers and developers helping the community to build a CMS that will be extensible, accessible, and easily pluggable. Fluid Engage intends to work closely with this community to fully integrate the CMS into the architecture of Fluid Engage. The Service Oriented Architecture of Collection Space should result in reusable solutions for the services layer in Fluid Engage. Many of the requirements for services are similar, meaning the two projects can make use of similar solutions. This collaboration will also ensure a high level of interoperability between the projects.

The experience of working on both Fluid 2007-2009 and on Collection Space has given the core team extensive experience collaborating with implementing institutions and partner projects. The lessons learned from early integration into higher ed applications will help the core team conduct early implementations with various museums and various museum enterprise solutions.

Implementation and Evaluation

Fluid Engage has brought together 3 core partners that collectively represent the range of challenges, innovative curatorial approaches, exciting projects and possible museum workflows that the project must address. These core partners will be joined by a number of other museums and galleries in the third quarter of the project and beyond.

Detroit Institute of Arts (DIA)

In support of the Fluid Engage project, the DIA will foreground two significant initiatives for the development of prototypes and modeling work processes. During the first year of the project, the DIA curatorial and interpretive staff will develop interpretive media for its special exhibition, "Through African Eyes: The European in African Art 1500 – Present," led by Ghana-born curator Nii Quarcoopome. This exhibition, with significant support from the National Endowment of the Humanities, will feature innovative mobile tour technology, in-gallery interpretive stations, and a significant on-line interpretive component. The materials developed with Fluid Engage will also benefit the exhibition tour that follows, the Nelson-Atkins Museum of Art in Kansas City in the Fall of 2010 and The Brooklyn Museum in Spring of 2011. Secondly, the Fluid Engage project period of April 2009 – April 2011 corresponds with a significant initiative from the interpretive programs section of the DIA to transform the DIA website into a significant resource for educators and students based upon the ground-breaking interpretive models developed for the permanent galleries. Visitor testing, with substantial formative evaluation components, will be in integral part of both initiatives.

After 2011, the tools and applications created through participation with Fluid Engage will become central to a broad-based initiative to expand upon the core interpretive philosophy of the DIA, as articulated at the onset of its recent reinstallation of collections, "interpretation is better understood as a means of communication between the museum and its audience, in which, 1) the audience is encouraged to engage in satisfying learning experiences; 2) the museum deepens its understanding of the audience for the purpose of better serving its visitors." (DIA reinstallation handbook, 2002). We believe that the Fluid Engage initiative will have a profound role in the viability and success of the DIA's future.

McCord Museum of Canadian History

The McCord Museum wishes to increase the access to its collections through use of emergent technologies. The priorities of the museum are to begin the strategic planning that will culminate in April resulting in a two year plan for the museum. The McCord wants to extend the physical exhibits by extending the experience through their website in a seamless integration of content, interaction, and access. Another area of particular interest to the McCord is the use of mobile technology that visitors come to the museum with. Through this project, the museum will allow visitors to interact with kiosks that will give exhibit information and allow visitors to download materials through their PDAs. In particular, the McCord is focused on the following outcomes of the Fluid Engage project:

- To increase the accessibility of the McCord collections by redefining the tools of mediation;

- To encourage greater interaction with the visitors with a view to diversification and expansion of customers;

- To support innovation and creativity in developing heritage material and engaging visitors in exploring this material by using emergent technologies and mobile tools (PDA, iPhone, etc.) ;

- To establish connections between the in-room and on-line experiences

- To support the greater interaction with the digital resources of the McCord Museum and expand on the existing tools (Web 2.0, "My McCord").

Museum of the Moving Image (MMI)

Fluid Engage will align with the efforts of CollectionSpace in many exciting ways. Through a partnership with the Museum of the Moving Image, MMI will use FluidEngage tools to develop a prototype handheld gallery guide for its core exhibition, "Behind the Screen." The exhibition is being renovated and updated for the 2010 grand re-opening of the Museum's expanded facility.

In 2001, the Museum introduced eDocent, a mobile wireless gallery prototype. After a successful launch and testing period in 2001, the Museum concluded that further development on visitor front-end experiences were fruitless until it had a stable yet dynamic core of collections information from which to draw, and turned its attention towards developing what is now CollectionSpace.

The prototype application will move beyond the usual handheld gallery tour application, allowing MMI visitors to make connections between items in the gallery and the museum's larger collection of 130,000 objects, 'append' messages to objects and media in the gallery, bookmark items for further exploration online or at a visitor kiosk, and 'take home' (on their mobile device) an animation that they create at the museum. MMI technical, education, and collections staff will be involved with year one of the project, which will result in a demonstrable prototype. Year two of the project will involve futher production as well as testing and evaluation.

Implementation Fund and Other Implementing Institutions

Many other institutions have expressed interest in implementing the Fluid Engage deliverables. These include the Walker Art Centre, the UBC Museum of Anthropology, the Royal Ontario Museum, the Art Gallery of Ontario and the Smithsonian American Art Museum to name a few. Many of these possible implementers will be represented on the Fluid Engage Advisory Panel. Fluid Engage will recruit additional museum implementers in the third quarter of the project rounding out the core partnership with institutions broadly representative of the range of institutional sizes, IT strengths and resources, curatorial philosophies or approaches and subject matter. These test implementations will be funded through an implementation fund.

An example of the type of implementation that would be supported by this fund is implementation by the Art Gallery of Ontario. The Art Gallery of Ontario has just completed a hugely successful relaunch following a dramatic reconstruction designed by architect Frank Gehry. In launching the new building, the gallery also committed to a more interactive and engaging visitor experience. The AGO will implement the Fluid Engage deliverables in a number of planned and ongoing initiatives:

- in the AGO.net architecture and UI re-design a major project to migrate content to a new content management system

- in their ongoing social media strategy made popular by their "In Your Face" exhibit

- in the redesign of "MyAGO" online and mobile which provides users with personalized accounts to create custom tours

- in the continued development of CollectionX.museum an online exhibit

- and in the roll out of AGO mobile.

The AGO will also help to test and refine integration with the TMS content management system.

Project Governance

The Community Source Model

Fluid Engage will employ a community source model, adopting the successful strategies of the Fluid, Kuali Student, Sakai and CollectionSpace projects. The overall strategy is to pool resources and intellectual capital investments and leverage them to create a sharable solution that is of, by, and for cultural institutions around the world. To shore up scarce technical resources, to broaden the structural base for sustainability and to leverage experience in community source projects, project partners will also include research and development teams at universities with experience in working with cultural institutions. As a community source project, Fluid Engage will employ the development principles of open source software with the project management of institutional investments of staff time. It will build on the SOA lessons from Kuali Student, and advance the "precarious values" and development methods of the Fluid Project.

Kuali, Sakai, Fluid, CollectionSpace and other projects have been perfecting and evolving the community source approach to pooling resources, knowledge sharing, and leveraging technical and user support to create attractive solutions for larger community. The software work products of community source are licensed for royalty-free use, modification, extension, or derivative works by institution, company, or individual using the Open Source Initiative approved Educational Community License. Fluid Engage will leverage and evolve these systems.

The distributed nature of the team requires and ensures that all communication and especially all decisions are explicit, transparent and comprehensible by the entire community. This also enables participation and input from the wider community and interested volunteers. The project will create support structures and collaboration tools to encourage broad participation in achieving the project deliverables and contributing related resources. Thus the project can be enriched by interested institutions not in the original partnership.

Project Structure Overview

At the center of the project governance structure is the Fluid Engage Steering Committee with representation from all core cultural institutions. The Steering Committee membership also includes the technical lead, the design lead and the project manager. The Steering Committee will govern the day-to-day progress of the project. The makeup of the Steering Committee ensures that the project direction is integrally grounded in and responsive to the needs and realities of cultural institutions.

The Steering Committee will be assisted by the Project Management Team consisting of the Project Manager and the financial and administrative coordinator. The project management team will work closely with project management and administrative staff at all participating institutions.

High-level project oversight will be provided by the Fluid Engage Board of Directors with representation from all participating partner institutions. The Board will have ultimate responsibility for project deliverables.

Project deliverables will be achieved by three tightly integrated teams: the Technical Team, Design Team and Implementation and Evaluation Team. The agile, iterative design and development process will ensure that there is frequent exchange of interdependent prototypes among these teams.

All teams will be informed and receive input, constructive criticism and advice from the advisory panel made up of prominent and strategic leaders in the museum and gallery community.

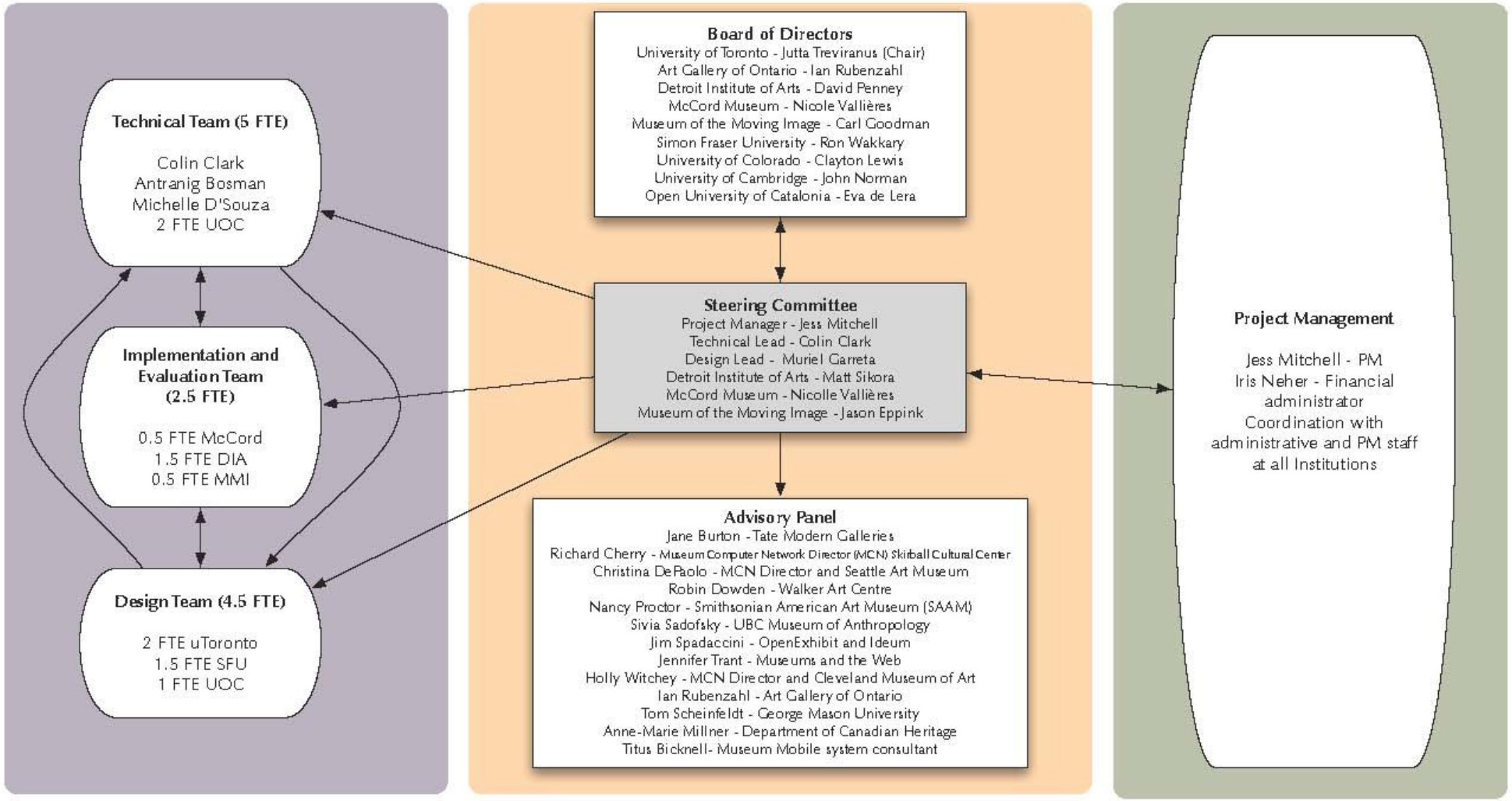

Figure 4: Proposed Project Governance

Project Management

Jess Mitchell, the Project Manager for Fluid, has significant experience leading large, complex, distributed projects. She is particularly skilled at drawing in all members to form a cohesive team. Another strength is her ability to facilitate rather than dictate in decision-making, strategic planning, and community outreach. With her leadership, the Fluid team has coalesced into a community that has focus, purpose, and vision. That community is strong and particularly well structured to do ambitious projects like Fluid Engage.

Members of the Fluid community are committed to flexibility, openness, collaboration, and communication. These principles encourage healthy and collaborative ways to work, make decisions, and ensure project outcomes. The success of the Fluid approach to project management can be attributed in large part to our continual efforts to refine processes, adapting and adjusting as needed.

Fluid Engage will continue this open approach, incorporating the unique practices of new team members and member institutions. The Fluid team accomplishes this openness by being committed to including all voices, ensuring the quality of the product, and pushing boundaries with innovative solutions.

All team members are encouraged to be thorough, curious, and communicative. Members work with a number of tools that help bridge the geographic gaps. We strive to keep communication frequent, with daily meetings that last approximately 15 minutes where the members give quick updates. This allows team members to stay connected personally, and make meaningful connections between their work and their colleagues', encouraging collaboration.

Both our development and design teams do paired work (often pairing team members with different experience levels and areas of expertise). The teams make iteration work plans every fortnight. These work plans are created from a breakdown of the quarterly project deliverables that have been further broken down to fit into monthly releases. So, the PM starts from the big picture perspective and then narrows down the work into tasks accomplishable in two weeks, an agile approach to development and design. With this process, the Fluid community is experienced at setting project goals within a realistic timeline and accomplishing them.

Fluid is committed to building products that can be used easily, so each member of the team plays a role in writing thorough documentation. We are dedicated to teaching others in addition to providing them with rich solutions. As an open community, we have endeavored to create an environment that includes volunteers and outside contributors. We are a community that is particularly interested in, and pays close attention to, team building and the positive outcomes that a healthy community has on deliverables.

The team succeeds in part because, where necessary, there are authoritative processes that are well-documented, publicly available, and created by the community. The Fluid team makes extensive use of the Apache model for decision-making for everything from commit access for developers to decision-making about strategic direction on design questions.

+1 = a positive vote

0 = abstain, have no opinion

-1 = a negative vote

The PM is committed to equally representing all partners. In the same way, all partners have equal voices in the project. The PM works to smooth cultural differences that result from different disciplinary perspectives and different practices. And furthermore the PM works to overlap the project goals with the local institution goals

where possible. The approach of the Fluid community is to find solutions to problems or opportunities that community members articulate.

1. Board of Directors

The Fluid Engage Board of Directors is comprised of the institutional leads for all partner institutions. The Directors are responsible for their institutional resource commitment to the project and are ultimately accountable for the execution of the project. The chair of the board is the lead PI on the project, Jutta Treviranus, from the University of Toronto.

The Fluid Board of Directors is made up of:

University of Toronto - Jutta Treviranus (Chair)

Detroit Institute of Arts - David Penney

McCord Museum of Canadian History - Nicole Vallières

Museum of the Moving Image - Carl Goodman

Simon Fraser University - Ron Wakkary

University of Colorado - Clayton Lewis

University of Cambridge - John Norman

Open University of Catalonia - Eva de Lera

2. Steering Committee

The Steering Committee will oversee the day-to-day progress of the project and will be responsible for design, development and implementation decisions. The majority of the Steering Committee will be made up of representatives from the cultural institution partners to support participatory design.

Wherever possible all decisions will be made at the level of the people working on the problem and every effort will be made to resolve any disagreements at that level. When consensus cannot be reached at this level there will be a decision-making escalation path from the teams to the Steering Committee and if necessary to the Board of Directors. It is our expectation and hope that this escalation path will never be necessary. It is believed that by utilizing the Apache decision-making tool and fostering a community, which seeks to understand, is open to healthy and respectful debate, and builds consensus wherever possible, we will produce a better product and a more sustainable community.

The Steering Committee is made up of the following members:

Project Manager - Jess Mitchell

Technical Lead - Colin Clark

Design Lead - Muriel Garreta

Detroit Institute of Arts - Matt Sikora

McCord Museum of Canadian History – Nicolle Vallières

Museum of the Moving Image - Jason Eppink

3. Advisory Panel

The Advisory Panel is made up of leaders and experts in the museum and gallery community. This includes members of the Museum Computer Network, leaders of collaborating projects, potential implementers of the Fluid Engage deliverables and innovators in mobile and online curation. The Advisory Panel will apply their expertise to ensure that the project learns from the successes and failures of the past, is well integrated into the museum community and becomes sustainable.

The members of the Advisory Panel will be:

Jane Burton - Tate Modern Galleries
Titus Bicknell- museum mobile system consultant
Richard Cherry - Museum Computer Network Director (MCN),and Skirball Cultural Center
Christina DePaolo - MCN Director and Seattle Art Museum
Robin Dowden - Walker Art Centre
Nancy Proctor - Smithsonian American Art Museum (SAAM)
Sivia Sadofsky - UBC Museum of Anthropology
Tom Scheinfeldt – Omeka, George Mason University
Jim Spadaccini - OpenExhibit and Ideum
Jennifer Trant - Museums and the Web
Holly Witchey - MCN Director and Cleveland Museum of Art
Anne-Marie Milner – Canadian Heritage Information Network
Ian Rubenzahl – Art Gallery of Ontario

4. Technical Team

The technical team will be responsible for the technical development in the project and will be led by Colin Clark the Technical Lead. Colin has extensive experience in adeptly leading the technical development in the Fluid Project. Colin will be assisted by experienced developers and software architects at the University of Toronto, Cambridge, and the Open University of Catalonia.

5. Implementation and Evaluation Team

Three core cultural institutions will help to iteratively design, implement and evaluate the project deliverables. The implementation and evaluation team will be made up of staff experienced in rolling out innovative programs and well positioned to deploy the tools and resources developed by the Fluid Engage project in their respective institutions. The team will be assisted by Museum Studies graduate students to assist in both the formative and summative evaluations.

6. Design Team

The design team will be led by a senior designer Muriel Garreta of the Open University of Catalonia who has extensive experience in inclusive design. The team will take design input and input regarding functional requirements from the implementation team. The design team will also receive extensive guidance on participatory design methods from Clayton Lewis and Ron Wakkary who are world leaders in participatory design within cultural institutions. The team includes UX designers and UX developers from UOC, the University of Toronto and Simon Fraser University.

Core Cultural Institution Partners	Description of Contribution and Role
Detroit Institute of Arts	- provide evaluation data about visitor needs for informal learning in museum environments - model exhibit development work processes - create interpretive exhibit projects for prototypes - evaluate prototype modules in real-time museum settings. More specifically: - summative evaluation on the new reinstallation will provide data and direction for selecting prototype projects - a web-based curriculum resource and social media tie-ins will be based upon our special NEH-funded exhibit, "Through African Eyes" - prototype "fitting room" for off-site desktop and mobile visitor designed tours of newly installed permanent collections galleries. - tie projects to a social media/e-philanthropy initiative.
McCord Museum of Canadian History	- increase the accessibility of the McCord collections by redefining the tools of mediation; - encourage greater interaction with the visitors with a view to diversification and expansion of customers; - support innovation and creativity in developing heritage material and engaging visitors in exploring this material by using emergent technologies and mobile tools (PDA, iPhone, etc.) ; - establish connections between the in-room and on-line experiences - support the greater interaction with the digital resources of the McCord Museum and expand on the existing tools (Web 2.0, “My McCord”). - bridge the Fluid Engage and CollectionSpace projects, enabling interoperability between the two
Museum of the Moving Image	- develop mobile gallery prototype application that connect display artifacts with items in the museum collection (drawn from CollectionSpace repository), other museum intellectual assets, and external digital resources. - utilize the FluidEngage Exhibit, Map, and Audio tour tools, social networking, Mobile and Web applications, and related underlying and related services to

	achieve this goal. - build from its pioneering work on the 2001 eDocent project, a prototype wifi-based gallery information system for off-the-shelf devices, with related institutional expertise.
Implementation Fund	This will support from 3 to 4 additional institutions in implementing and testing the Fluid Engage deliverables

Core University Partners	**Description of Contribution and Role**
University of Toronto	- lead institution for project - overall project management and administration - technical leadership - UX design and development - expertise in inclusive design - context and location aware mobile system expertise - Museum Studies evaluation input - Web accessibility expertise
University of Colorado, Boulder	- offer expert advice on HCI - cognitive accessibility - mobiles systems expertise and existing relationships with Android - Open Social expertise - system integration experience
Simon Fraser University	- contribute participatory design coordination and support of the project - haptic and tactile expertise - extensive museum experience
Cambridge University, UK	- contribute user engagement with Museum Staff and Visitors to ensure the project meets UK and European needs (up to 20 individuals from up to 6 museums)

University of Catalonia, ES	- Java/Javascript developer with Fluid development experience. - synergistic input from CollectionSpace developers. - UX lead - expertise in accessibility - UI design expertise - connection with European museums

Advisory Panel	**Description of Contribution and Role**
Tate Modern Galleries - Jane Burton	advice and direction
Walker Art Center - Robin Dowden	advice and direction
Museum Computer Network Director (MCN),and Skirball Cultural Center - Richard Cherry	
MCN Director and Seattle Art Museum - Christina DePaolo	advice and direction
MCN Director and Cleveland Museum of Art - Holly Witchey	
OpenExhibit and Ideum - Jim Spadaccini	advice and direction, coordination with Open Exhibit
Smithsonian American Art Museum (SAAM) - Nancy Proctor	advice and direction, mobile systems
UBC Museum of Anthropology - Sivia Sadofsky	advice and direction, cultural museums
Titus Bicknell	advice and direction, mobile integration

Center for History and New Media, George Mason University - Tom Scheinfeldt	advice and direction, integration with Omeka
Museums and the Web - Jennifer Trant	advice and direction
CHIN – Anne-Marie Millner	advice and direction – needs of broader museum community
Art Gallery of Ontario - Ian Rubenzahl	advice and direction

Corporate Contributors	**Description of Contribution and Role**
RIM	Consultation and Equipment Donation (smart phones)
Google	Consultation and Equipment Donation
Apple Canada	Consultation and Equipment Donation
Rogers	Consultation and Equipment Donation

Appendix 2: Partner Institution Descriptions

University of Toronto (PI)

The University of Toronto will be represented by the Adaptive Technology Resource Centre with broad participation from the Faculty of Arts and Science, the Ontario Institute for Studies in Education and nine other faculties across the university.

The ATRC is a centre of expertise on inclusive design of information systems. The ATRC conducts proactive research and development to ensure that emerging information technologies accommodate the full range of human diversity including culture, language, age, and ability. The ATRC's influential role nationally and internationally has been recognized in numerous awards. The CNIB has dubbed the ATRC "a national treasure." Through a large number of multi-partner projects, the ATRC has formed an extensive international network of consumer organizations, research centres, and corporations concerned with inclusive design of information systems and practice.

The centre is engaged in an average of 18 research and development projects at any one time. It also conducts extensive education and outreach activities regarding inclusive design. Experts at the centre have helped to create policy, standards and exemplars in a broad range of domains including education, banking, public Web sites, edemocracy, and cultural exchange.

The University is Canada's largest Universities (with over 65,000 students) and highest ranking research University. The University of Toronto has 75 Ph.D. programs and 14 professional faculties. Over 6,000 international students attend the university, representing 9% of the overall student population and 13% of students in graduate studies.

In all, there have been eight Nobel laureates affiliated with the University of Toronto as faculty or students. The university's professors have received almost a quarter of all national awards in the last twenty years, although they represent just over seven percent of Canada's university professors.

The size of the university has allowed it to offer a large variety of courses, from Intermediate Sanskrit, to Computational Genomics, Estonian Literature and Slavic Studies. The university's endowment exceeds $1.6 billion—far larger than any other Canadian university. It has an operating budget of $1.1 billion, with $517 million in research and grant and contract support. The university has nearly 100 spin-off companies with over 3,000 employees and revenues of $821 million. The university itself is the 15th largest employer in the Greater Toronto Area. The University of Toronto publishes more research than any other university in North America besides Harvard University.

Cambridge University, UK

Cambridge University will be represented on the FLUID project through CARET, the Centre for Applied Research in Educational Technologies. CARET's projects are selected to promote best practice in elearning and the application of educational technology. CARET aims to develop generic tools and systems to support the delivery, assessment and evaluation of pedagogically sound online education, and to establish Cambridge University as a world-leader in this area.

CARET is providing a hot-house environment in which academic staff and students from all departments are able to work alongside resident experts to develop new components for their courses – emphasis is being placed on the innovative and creative use of new technologies for online education.

A critical contribution to the FLUID project by the University of Cambridge and the CARET group will be the presentation framework RSF.RSF is a Java presentation framework that grew out of CARET's work in applying Sun's JSF to the task of developing institutional applications, for both administration and teaching. During the course of this work it was discovered that due to its corporate origin and goals, there were several aspects to JSF (as well as other competing view technologies) that made it unsuitable for these applications. Typical corporate applications are developed and deployed once, often by relatively unskilled teams, but generally with the benefit of commercial and vendor support and often with the support of an expensive toolchain. Institutional applications, by contrast, require configuration and customization, sometimes extensive, not just per institutional deployment, but even to take account of special needs and requirements of individual users. Further, developers of the applications typically work without commercial support, using open source or freely available toolsets.

The benefits of RSF fall under two main headings. Firstly, the primacy of raw markup in the design process reenfranchises designers and brings accessibility work closer to those with the relevant expertise. There are a growing number of web frameworks that emphasise the use of "pure HTML templating" (starting with the partial example set by Apache's Tapestry) but RSF's implementation is the purest yet, making a complete separation between the world of markup designers and developers. As well as previewability of *appearance* RSF also emphasizes previewability of *behaviour*. It is possible to hand a zipped collection of HTML, CSS and JS files, forming theRSF template collection, to a design or usability team that allows a complete walkthrough, with functional links, of an application's complete interface complete with samples of any "live" behaviour that at runtime would be provided by Javascript or AJAX dynamic behaviour. This makes usability and accessibility work unprecedentedly easy, and smooths the round-tripping process between usability experts, designers and developers.

The second heading for RSF benefits relate to its internal design. This emphasizes a fine-grained modular application design based on modern inversion of control (IoC)principles (RSF is actually built on the widely adopted and popular Spring framework), together with a respect for natural web browser idioms that users have grown familiar - an RSF application is as far as possible a stateless design ("REST"ful, in the current idiom) with its behaviour specified declaratively. This is of primary interest with respect to the ultimate goals of the FLUID project as they relate to more ambitious "refactorings" of the user experience, for example "reorchestrating" an application so that functionality which was presented sequentially to a user is now presented simultaneously, or vice versa. A core RSF feature, introduced in the recent release of RSF 0.7, is the "Universal View Bus" which is a generalised web service automatically derived from an RSF application's structure, and suitable for communicating with a "more intelligent" client such as a Javascript-enabled browser.

The key point is that RSF "bakes in" unprecedently few design decisions into the application's structure, enabling the same application to be adapted through configuration to the widely differing needs of users. Whilst RSF offers exemplary support for "Web 1.0" applications with extremely thin clients (as well as very low capability clients such as mobile devices), the same application may be repackaged for increasingly thick and capable clients, or users with a taste for more dynamism in the interface with minimal changes. As such RSF harmonises very closely with the goals of the FLUID project by providing the substructure by which the application reorganisation specified and configured within FLUID is to be encoded and expressed.

RSF has been under development at CARET for over 18 months as of January '07, and is being used in increasingly many projects both here and round the world. Not all of these projects are even strongly Java-oriented - as the most language-neutral of the Java web frameworks, RSF is also a natural fit for XML-pipeline based programming based for example on Apache's Coccoon framework, which has been a particular area of expertise at CARET. CARET's aims have always been to shift thefocus of design and development closer to the originating userbase, and XML-based development offered a route whereby significant design responsibility could be placed in the hands of users and other non- developers - RSF is the continuation of this trend, and along with work over the next year in improving RSF documentation and development infrastructure, we will be looking more towards the usecase of "dynamic applications" whereby applications are coded up more informally

"on the fly" by their users in a style more similar to the highly popular non-Java frameworks such as PHP. Providing this style in a Java environment ensures that the benefits of rapid development are achieved with the least compromise to overall application portability and integrity. The highly fruitful and dynamic community built around PHP and Ruby-based applications show the benefits that can result when the user and designer community are integrated and reenfranchised.

The University is committed to supporting RSF until it is adopted by a larger organisation or rendered obsolete be a superior new technology. At the same time Cambridge is keen to expand the pool of developers outside the University and is engaged in providing training to that end.

Detroit Institute of Arts (DIA)

The Detroit Institute of Arts (DIA), one of the foremost art museums in the United States, is home to a collection of more than 60,000 works known for its quality, range, and depth. The museum offers a wide range of special exhibitions, public programs, and education initiatives for the Detroit community and visitors from around the globe. The DIA is housed in a 650,000 square foot facility composed of a renowned Renaissance Revival building designed by architect Paul Cret and two wings recently renovated by architect Michael Graves. The DIA operates with an annual budget of approximately $33m with the assistance of a $110m operating endowment, substantial, private philanthropic support and a modest (less than $1m) amount of public funding from the State of Michigan.

Between 2001 and 2007, the DIA completed a major architectural remediation and reinstalled all of its 150,000 square feet of permanent gallery space using collaborative team processes and a visitor-centered philosophy, with great critical and popular success. In the year since reopening, attendance has nearly doubled from pre-reinstallation levels. Two capital campaigns created to fund the project raised a total of nearly $350m over nine years, paying off all construction costs and funding operating expenses during the six-year construction period.

The DIA has a long history of leadership in the arena of exhibition development, interpretation, and visitor research. The Fluidengagement project builds upon strategic necessity to expand digital media for gallery experiences and on-line offerings linked to its permanent collections galleries and exhibitions programs, targeted in particular to educational audiences. An expanded inventory of digital resources also supports the broad-based public annual fund (membership, e-philanthropy, annual giving) by extending outreach and relationship building, with the goal of creating 150,000 contributors to the DIA by the 2012. DIA success in this initiative is critical to its long-term sustainability.

In support of the Fluidengagement project, the DIA will foreground two significant initiatives for the development of prototypes and modeling work processes. During the first year of the project, the DIA curatorial and interpretive staff will develop interpretive media for its special exhibition, "Through African Eyes: The European in African Art 1500 – Present," led by Ghana-born curator Nii Quarcoopome. This exhibition, with significant support from the National Endowment of the Humanities, will feature innovative mobile tour technology, in-gallery interpretive stations, and a significant on-line interpretive component. The materials developed with Fluidengagement will also benefit the exhibition tour that follows, the Nelson-Atkins Museum of Art in Kansas City in the Fall of 2010 and The Brooklyn Museum in Spring of 2011. Secondly, the Fluidengagement project period of April 2009 – April 2011 corresponds with a significant initiative from the interpretive programs section of the DIA to transform the DIA website into a significant resource for educators and students based upon the ground-breaking interpretive models developed for the permanent galleries. Visitor testing, with substantial formative evaluation components, will be in integral part of both initiatives.

After 2011, the tools and applications created through participation with Fluidengagement will become central to a broad-based initiative to expand upon the core interpretive philosophy of the DIA, as articulated at the onset

of its recent reinstallation of collections, "interpretation is better understood as a means of communication between the museum and its audience, in which, 1) the audience is encouraged to engage in satisfying learning experiences; 2) the museum deepens its understanding of the audience for the purpose of better serving its visitors." (DIA reinstallation handbook, 2002). We believe that the Fluidengagement initiative will have a profound role in the viability and success of the DIA's future.

Musee McCord Museum

A unique forward-looking and thought-provoking museum. The McCord is a public research and teaching museum that preserves our collective past - over 1,375,000 objects, images and manuscripts, irreplaceable reflections of the social history and material culture of Montreal, Quebec and Canada - a true source of inspiration. The McCord reaches out to the world by exploring contemporary issues and engaging with communities at the local, national and international level to further the appreciation and understanding of Canadian heritage.

Museum of the Moving Image

The mission of the Museum of the Moving Image is to advance the public understanding and appreciation of the art, history, technique and technology of film, television, and digital media. It does so by collecting, preserving, and providing access to moving-image related artifacts; screening significant films and other moving-image works; presenting exhibitions of artifacts, artworks, and interactive experiences; and offering educational and interpretive programs to students, teachers, and the general public. The Museum's core exhibition, "Behind the Screen", spans two floors and enables visitors to learn how moving images are made, marketed, and shown. The Museum presents 300 curated film and video screenings annually; serves 30,000 students each year through education programs that use film, television and digital media to offer new perspectives on the study of history, literature, and science; and maintains a collection of 125,000 moving image artifacts. In late 2007, Moving Image will embark on its first major expansion, a complete renovation of the existing first floor and a three-story addition housing theaters, galleries, and an education center. This environment will enable the Museum to expand its programs and present them in state-of the- art facilities, reinforcing its place intellectually and physically as one of the world's great moving image institutions. The Museum welcomes 90,000 visitors each year. The Museum offers a wide array of technology-based offerings for school groups and after-school programs and in February 2007 was cited by Businessweek.com as a leader among U.S. museums using technology to educate young audiences.

Open University of Catalonia

The Open University of Catalonia is a distance learning university created in 1995, committed to the value of social transformation offered by education and culture. The UOC promotes creativity, innovation, cooperation and exchange between its university community, other universities, institutions, the business network and Catalonian society.

The main objective of the UOC is for each person to meet their educational needs with the highest level of access to knowledge. With this purpose, the University makes intense use of information and communication technologies and offers an educational model based on the personalisation and permanent support of the student, beyond limitations of time and space.

This University has received a number of awards such as the ICDE 2001 Award for Excellence, which recognises it as the best virtual and distance learning university in the world, or the award received by Dr. Ferraté when holding the position of Rector of the Open University of Catalonia for Educational Quality in 2004, an annual award made by the Institute for Advanced Education at the Organisation of American States for his contribution

to the expansion and consolidation to the new knowledge society with his initiative of virtual metacampuses.

The Office of Learning Technologies follows a User Centered Design (UCD) approach which consists of implementing design processes in which end users influence how a design takes shape. It is both a broad philosophy and a variety of methods. There is a spectrum of ways in which users are involved in UCD and the key issue is that users are involved in the definition, design and evaluation of UOC's applications and online environment.

Simon Fraser University (SFU)

The School of Interactive Arts + Technology (SIAT) at SFU is an interdisciplinary research focused school where technologists, artists, designers and theorists collaborate in innovative research and immersive study. SIAT is an interdisciplinary research-oriented school that marries art and science, using technology as the foundational medium, and with the motivation of designing with people in mind.

University of Colorado at Boulder

As the flagship university of the state of Colorado, CU-Boulder is a dynamic community of scholars and learners situated on one of the most spectacular college campuses in the country. As one of 34 U.S. public institutions belonging to the prestigious Association of American Universities (AAU)—and the only member in the Rocky Mountain region—CU-Boulder has a proven tradition of academic excellence, with four Nobel laureates and more than 50 members of prestigious academic academies. CU-Boulder has blossomed in size and quality since it opened o in 1877 and attracts superb faculty, staff, and students and building strong programs in the sciences, engineering, business, law, arts, humanities, education, music, and many other disciplines.

Appendix 3: Project Board Bios

Jutta Treviranus

Jutta Treviranus is the Principle Investigator. Jutta will apply her extensive experience and expertise in directing large multi-partner, multi-sector projects as well as her expertise in inclusive design.

Jutta Treviranus established and directs the Adaptive Technology Resource Centre (ATRC) at the University of Toronto, an internationally recognized centre of expertise on barrier-free access to information technology. She has more than 25 years of experience in the field of access technology and inclusive design. Jutta has led a large number of national and international multi-partner research networks (including the Fluid Project, The Inclusive Learning Exchange, the Canadian Network for Inclusive Cultural Exchange, the Network for Inclusive Distance Education, CulturAll, Stretch and the Barrierfree project), that have led to a range of broadly implemented technical innovations that support inclusion. She has published in many areas related to inclusive design. She is chair of the Web Access Initiative, W3C, Authoring Tool Working Group, chair of the IMS AccessForAll Specification Working Groups, Project Editor within ISO/IEC JTC1 SC36, as well as a member of a number of key advisory panels and task forces relevant to IT policy, strategy and design.

Among the many awards received by the ATRC is the American Foundation for the Blind Access Award (1998), the Trophee de Libre for Open Source Development, the IMS Learning Impact Award and the Dr. Dayton M. Forman Memorial Award. Jutta holds faculty appointments in the Faculty of Information Studies, the Faculty of Medicine, and the Knowledge Media Design Institute, at the University of Toronto.

Eva de Lera

Eva de Lera is a senior strategist for the Office of Learning Technologies at Universitat Oberta de Catalunya, providing: Business development and team leadership, Strategic thinking and project management, Development of innovation and educational technology strategies and initiatives, Research and design of online engagement, User experience evaluation and design, as well as International relations and outreach. Her background is in media, marketing communications and technology, mostly in higher education institutions.

Carl Goodman

Carl Goodman is Senior Deputy Director of the Museum of the Moving Image, where he supervises the Museum's use and study of digital media and oversees its programming, education, and collections initiatives. As Curator, and then Director, of Digital Media, he has organized many exhibitions for the Museum including *Computer Space*, a history of video games, and *DigitalMedia,* a gallery of software-based art. Mr. Goodman is executive producer of the Museum's web projects, including *The Living Room Candidate*, an online exhibition about the 56-year history of presidential campaign television commercials. He serves as Principal Investigator of CollectionSpace, a multi-institutional collaboration that aims to significantly enhance the ways in which Museums manage, reuse, and disseminate collections information. Mr. Goodman organizes and hosts the Museum's continuing digital media public programs, which play host to noted digital media professionals, artists, and engineers. Carl served as project lead of eDocent, a 2001 prototype gallery information system using off-the-shelf handheld devices.

Clayton Lewis

Clayton Lewis is Professor of Computer Science, Fellow of the Institute of Cognitive Science, and Scientist in

Residence at the Coleman Institute for Cognitive Disabilities at the University of Colorado, Boulder, where he has been based since 1984. He is well known for his research on evaluation methods in user interface design and has more than 25 years of experience and in HCI and software user experience design. Prior to joining the University of Colorado, Lewis was Manager of Human Factors at IBM's Watson Research Center. He was named University of Colorado President's Teaching Scholar in 1989, a life title signifying the University's highest award for teaching. He served as Computer Science department chair from 1999 to 2003. He earned an AB in mathematics from Princeton University, an MS from MIT, for interdisciplinary study in mathematics and linguistics, and a PhD from the University of Michigan in experimental psychology.

John Norman

John is the Director of the Centre for Applied Research in Educational Technologies and 'Head of e-Learning' at the University of Cambridge. CARET provides infrastructure and support to the campus for the use of technology in teaching, learning and research, including the deployment of Sakai campus-wide. Prior to this he had experience as an engineer and medical devices entrepreneur on 3 continents. John chairs the advisory board for OSS-Watch and is an advocate for open standards and open source software in higher education.

David Penney

David Penney is Vice President of Exhibitions and Collections Strategies at the Detroit Institute of Arts. David's specialties are Museum-based project development and management; team processes, organizational development, interpretation, Native American collections expertise

Nicole Vallières

Nicole Vallières joined the McCord team in 1989. Since taking up her mandate, she has restructured both the collection management and archival services and supervised the computerization and digitizing of the collections. In addition, she launched the museum's Website that comprises an online public program featuring, notably, a series of virtual exhibitions, a database containing more than 125,000 photographic documents from the McCord's collection, and the on line education program EduWeb, which is based on the McCord's collections. EduWeb is expanding virtual teaching resources in conjunction with (national) educational programs. She has been appointed Director, Collections, Research and Programs in 2007 and, in this capacity, she heads the entire museum's research and public program services, online and on site. Nicole Vallières is regularly invited to sit on various committees of museum professionals, both at the national and international level, and has delivered numerous papers at scientific and professional forums. Nicole holds a PhD in ethnology-history

Ron Wakkary

Ron Wakkary is Associate Professor in the School of Interactive Arts & Technology at Simon Fraser University in British Columbia. His primary research is in interaction design with a focus on tangible computing and responsive environments, and the study of "everyday design" in which we all contribute to the ongoing design of artifacts and surroundings.

Wakkary led the Am-I-able Network for Responsive and Mobile Environments, a national research network in the design of wearable and ambient intelligence computing. He was the co-leader of the Interactivity Theme in the Canadian Design Research Network. His research projects include a mobile-based social game for mobile communities in collaboration with Nokia Research, projects in adaptive audio and tangible user interface museum guides with the Canadian Nature Museum and the Surrey museum, and ambient intelligent environments for physical play. The Social Sciences and Humanities Research Council, Canadian Heritage,

Canarie Inc., Canada Council, Networks Centres of Excellence, and Canada Foundation for Innovation have funded his research.

Wakkary's public and academic service has included the Canadian Culture Online Advisory Board to advise the Minister of Canadian Heritage, the College of Reviewers for the Canada Research Chair Program, Banff New Media Institute Research Advisory Board. He was elected to the Board of Governors for the Technical University of British Columbia and the Simon Fraser University Senate. He has served on several conference program committees as program and paper chair and co-chairs including ACM CHI, Tangible and Embedded Interaction Conference, ACM Multimedia, and ACM Creativity and Cognition Conference.

Prior to his academic career, Wakkary was cofounder of Stadium@Dia in partnership with the Dia Center for the Arts in New York where he collaborated and co-developed pioneering projects in art and the Internet, and partnered on projects with the Museum of Modern Art, Dia Center for the Arts, and the Guggenheim Museum. He was also principal designer and co-founder of oo-design, a digital design firm.

Appendix 4: Advisory Board Bios

Anne-Marie Millner

Canadian Heritage Information Network, Government of Canada Department of Canadian Heritage

Anne-Marie Millner is the Manager, Content Management and Capacity Building for the Canadian Heritage Information Network (CHIN), a special operating agency of the Government of Canada's Department of Canadian Heritage. She directs the professional development program for museum professionals, including the areas of information management, digital content creation, management and presentation. Her team provides products, services and guidelines for this purpose, including: collections information, technology assessment, data and interoperability standards, professional development resources, online learning tutorials, access to experts and communities of practice. These resources are developed both in house, and through partnerships with other heritage organizations.

Anne-Marie has worked for many years in the cultural sector, both in cultural industries and in new technologies. While working as a full time, she obtained a Master of Business Administration degree from the University of Ottawa, graduating in 2000. As part of her degree, she completed a special project on Government of Canada Internet sites. Following graduation, she joined the federal civil service as a Senior Policy Analyst for the Canadian Culture Online (CCO) strategy, which was formed to encourage a uniquely Canadian presence on the Internet. While at CCO, she was responsible for many projects and files, including: the development of policies on e-learning and cultural diversity, the creation of Aboriginal and ethno-cultural online initiatives, and the program guidelines for the New Media Research Networks Fund. Shortly before leaving CCO in 2006, Anne-Marie completed the Treasury Board submission that led to the renewal of the Canadian Culture Online strategy. Anne-Marie also serves on the Board of Directors of the Museum Computer Networks, and is the Chair of the Professionalization Committee.

As the manager of professional development at CHIN, Anne-Marie manages the Professional Exchange, http://www.chin.gc.ca/English/Knowledge-Exchange/index.php,

a space where museum professionals can learn about the latest technologies and share information with their colleagues. The Exchange provides museum professionals the necessary tools for skills acquisition and Anne-Marie is constantly looking for new avenues, both domestic and international, to improve learning opportunities and skills acquisition for museum workers.

Christina DePaolo

Seattle Art Museum, Museum Computer Network

Christina DePaolo is New Media Manager at the Seattle Art Museum since 1997. She led SAM's initial web site construction and oversees its ongoing evolution as a communication tool. She heads up the New Media Team that implements exhibition related interpretive technologies including development of interactive learning kiosks. Christina is currently on the board of MCN (Museum Computer Network) and on the Advisory Board of the Multimedia Design and Production department for Lake Washington Technical College. Prior to SAM Christina was at Artist Trust, a not-for-profit organization dedicated to supporting Washington State artists working in all creative disciplines. Christina has a B.A. in Political Science from Hunter College, New York, NY. Her strength is working on interdisciplinary projects that incorporate technology and art to advance the mission of the museum.

Holly Witchey

Cleveland Museum of Art, Museum Computer Network

Holly Witchey is currently Director of New Media at the Cleveland Museum of Art. In addition, she serves as a member of the Board of Directors of Museum Computer Network, and is an AAM appointed member to the National Committee for Archives, Libraries, and Museums (CALM). From 2002 -2007 she served as a member of and, eventually, chair of the American Association of Museum's Media & Technology Standing Professional Committee. Witchey has a Ph.D. in 15th Century Italian Painting and Sculpture. As Associate Curator of European Art at the San Diego Museum of Art, she began developing content-rich projects for museums using new technologies. In 2000 she left the curatorial world to start the New Media Department at the Cleveland Museum of Art. Witchey writes and speaks about museum ethics, accessibility, and issues that have arisen as a result of the use of new technologies in museum settings. She is the author of three books.

Jane Burton

Tate, London

Jane Burton is Head of Content and Creative Director, Tate, London. She is responsible for developing and delivering the creative strategy for Tate's video and film productions, and for digital interpretation at the four Tate galleries. Her current film productions include a series of documentaries about artists for UK television, the video podcast series TateShots, and animation-based programmes on art for children. Her most recent work on handheld tours includes the UK's first tour for the iPod touch and iPhone, launched for the Gustav Klimt show at Tate Liverpool in May 2008, and a pilot multimedia tour for school groups that invites user generated content. She initially joined Tate in 1999, as Tate Modern's Curator of Interpretation, where, in 2002, she introduced the first wireless multimedia tour to be used in a gallery. Before that, she worked as a journalist and art critic for national newspapers.

Jennifer Trant

Archives & Museum Informatics, Museums & the Web, ichim

Jennifer Trant is a Partner in Archives & Museum Informatics and consults on digital cultural strategy and collaboration. She is co-chair of Museums and the Web and ichim, and has served on the program committees of the Joint Digital Libraries (JDL) and the Digital Libraries (DL) conferences, the Culture Program Committee of the International World Wide Web Conference, and the Board of the Media and Technology Committee of the American Association of Museums.

Trant was the Executive Director of the Art Museum Image Consortium (AMICO) from 1997-2005. She was Editor-in-Chief of Archives and Museum Informatics: the cultural heritage informatics quarterly from Kluwer Academic Publishers from 1997-2000. Prior to joining Archives & Museum Informatics in 1997, Jennifer Trant was responsible for Collections and Standards Development at the Arts and Humanities Data Service, King's College, London, England. As Director of Arts Information Management, she consulted regarding the application of technology to the mission of art galleries and museums. Clients included the now closed Getty Information Institute (then the Getty Art History Information Program) for whom she managed the Imaging Initiative and directed the activities of the Museum Educational Site Licensing Project (MESL). She also managed disciplinary review and prepared the report of the Art Information Task Force (AITF), entitled Categories for the Description of Works of Art for the College Art Association and AHIP.

A specialist in arts information management, Trant has worked with automated documentation systems in major Canadian museums, including the National Gallery of Canada and the Canadian Centre for Architecture, where

she developed and implemented common cataloguing standards for the Prints and Drawings, Photographs, and Archives Collections. She has been actively involved in the definition of museum data standards, participating in numerous committees and regularly publishing articles and presenting papers about issues of access and intellectual integration. Her current interests center around the use information technology and communications networks to improve access to cultural heritage information, and to integrate the culture fully into digital libraries for research, learning and enjoyment. In addition to her consulting practice, Trant is a PhD Candidate in the Faculty of Information at the University of Toronto, where she is researching the role of folksonomy in museums.

Jim Spadaccini

Ideum

Jim is the director and founder of Ideum. Formerly he was the Director of Interactive Media at the Exploratorium in San Francisco. While at the Exploratorium, his department was responsible for developing educational Web resources and media exhibits for the museum floor. For his work at the Exploratorium, he received a Smithsonian Computerworld Award, an Association of Science and Technology Centers Award for Innovation and three consecutive Webby Awards for "Best Science Site." Jim taught courses on design and technology at SFSU's Multimedia Studies Program for seven years starting in the mid-90s and currently teaches for the Cultural Resource Management Program at University of Victoria, British Columbia and the Technology-Enhanced Communication for Cultural Heritage (TEC-CH) program at the University of Lugano, Switzerland.

Nancy Proctor

Smithsonian American Art Museum

Nancy Proctor has nearly 10 years' experience and expertise in developing mobile interpretation solutions for museums around the world. The majority of her work in this period was with Antenna Audio, one of the world's largest producers of museum and cultural tours. As Head of New Product Development for 8 years, Nancy established and grew the new product department to develop multimedia tours, sign language guides, phone-based tours, podcasts, vodcasts, downloadable audio tours, virtual tours, and software for assembling, managing, and datamining tour audio and multimedia content. Among the major mobile projects she developed are Tate's multimedia tours, which won a BAFTA award from the British Academy in 2003; the Louvre's multimedia tour, which is the largest multimedia tour installation in the world; the Van Gogh Museum's multimedia tour, which won a MUSE award in 2005; the multimedia tour of the exhibition, "Star Wars: Where Science Meets Imagination" for the Boston Museum of Science in 2006; the multimedia tour of the recently-opened Museum of Islamic Art, Doha; the American Sign Language multimedia tour of Baltimore's Great Blacks in Wax Museum, which also won a MUSE award in 2005; award-winning podcasts for SFMOMA, the National Gallery in London, and Chicago's Millennium Park; and cellphone tours at Tate Modern and Tate Britain.

Nancy has been responsible for the full range of activities required in mobile product development, from ideation and research through budgeting, project management, product build and testing, evaluation, 'early adopter' sales, pilots and initial product implementations and finally serving as 'ambassador' in presenting the company's products to the press and industry at large. As a member of the company's senior leadership team, Nancy worked with the CEO, CFO and regional managing directors to develop business strategy and forecasting for new products internationally. As Head of New Media at the Smithsonian American Art Museum, Nancy is currently developing mobile programs for audio and multimedia players as well as cellphones that will be integrated into the Museum's other digital content environments. In addition, to this work, Nancy continues to teach, lecture and publish globally on museum interpretation for digital platforms.

Rich Cherry

Skirball Cultural Center, Museum Computer Network

Rich Cherry is the Director of Operations at the Skirball Cultural Center in Los Angeles, where he oversees Information Technology, Operations, Admissions, Facilities, Security, capital projects and more than $70 million in ongoing construction. Previously he was the CIO and Director of Facilities at the Solomon R. Guggenheim Museum and before that the CIO of the Albright-Knox Art Gallery. He has also taught New Media theory, web design and animation in the Media Studies department at the State University of New York at Buffalo.

His experience includes executive management of Information Technology, Web Services, Library Services, Digital Imaging, Museum Admissions, Security and Facility departments. He has initiated, developed funding streams for and implemented significant technology projects in all areas of museum operations, including major network infrastructure upgrades, digitization of collections, online access to the collection management systems, library catalog, educational material and selections from the archives, as well implementing and integrating retail, financial, visitor and membership management systems.

He is also a board member of the Museum Computer Network serving on the finance committee and as chair for vendor relations and he has been a member of the Program Committee for the Museums and the Web Conference since 2005. He is a founding member of Steve.Museum and serves on the steering committee.

He has served on committees such as the WNED Life Long Digital Learning Advisory Committee (www.thinkbright.wned.org), advising the regional PBS on using digital media for education and as Chair of the Technology Committee for the Art Museum Image Consortium, a consortium dedicated to enabling educational use of museum multimedia.

Robin Dowden

Walker Art Centre

Robin Dowden is director of new media initiatives and chair of the audience engagement and communications team at the Walker Art Center. Together with her department, she is responsible for developing the Center's use of interactive and emerging technologies including multimedia computer applications (Dialog table), telephony-based audio-information resources (Art on Call), the Walker's Web site, and projects to create digital resources. Robin directs Internet-based special projects including ArtsConnectEd, a joint initiative of the Walker and The Minneapolis Institute of Arts and mnartists.org, an online resource for Minnesota artists developed by the Walker and The McKnight Foundation. Prior to joining the Walker, Dowden was the Collections Systems and Web Site Manager at the National Gallery of Art, Washington, D.C.

Sivia Sadofsky

Museum of Anthropology UBC

Sivia Sadofsky has extensive experience and expertise in business processes as they connect to software development and deployment projects. She brings to the project detailed knowledge of how small to mid-sized cultural institutions intend to use the products of the fluid engage project; ability to be a sounding board and assist in decision making if/when needed; feedback on quality assurance as it impacts the users of the products; and input on similar but divergent projects from the Museum of Anthropology at UBC's current set of projects.

Titus Bicknell

Museum Consultant

Apart from a fascinating stint at NBC Universal in 2007-8 working on the big screen, Titus Bicknell has spent the last 10 years exploring the small screen both web and handheld. As co-founder of TheGalleryChannel.com, Chief Engineer at Antenna Audio and subsequently Head of Mobile Technologies at Discovery Communications, he was fortunate to participate in ground breaking handheld projects at Tate Modern, the Louvre, Pompidou, the Intel Museum, and the Getty, among others. He has recently joined Hendricks Investment Holdings LLC to help develop technology solutions for a number of pedagogical experiences including the Gateway Canyons Resort and the Gateway Colorado Automobile Museum.

Titus has extensive experience and expertise in the development of mobile interpretation systems ranging from locally stored pure audio to location-based wirelessly delivered user specific multimedia solutions for museums and cultural destinations; the design and implementation of information management systems, interpretation software and interpretation platforms for arts organizations; collaboration with and consultancy for museum technology, education, interpretation and curatorial departments to achieve interdisciplinary solutions for online and in gallery interpretation solutions.

Tom Scheinfeldt

George Mason University

Tom Scheinfeldt is Managing Director of the Center for History and New Media and Research Assistant Professor of History in the Department of History and Art History at George Mason University. Dr. Scheinfeldgt has ten years of hands on experience executing digital humanities projects and working with cultural heritage organizations to improve their use of technology; he has lectured and written extensively on the history of popular science, the history of museums, history and new media, and the changing role of history in society, and has worked on traditional exhibitions and digital projects at the Colorado Historical Society, the Museum of the History of Science in Oxford, The Louisiana State Museum, the National Museum of American History, and the Library of Congress. Tom developed Omeka, an open source web publishing platform for cultural heritage. In addition to managing general operations at the Center for History and New Media, Tom directs several of its online history projects, including Omeka, the September 11 Digital Archive, the Hurricane Digital Memory Bank, the Papers of the War Department, 1784-1800, and Gulag: Many Days, Many Lives.

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