

## **Time-to-Adoption Horizon: One Year or Less**

- Mobiles
- Tablet Computing

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- Augmented Reality
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## **Time-to-Adoption Horizon: Four to Five Years**

- Digital Preservation
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## **Time-to-Adoption: One Year or Less**

### **Mobiles**

Mobile phones — distinct from new sorts of larger format mobile devices such as the iPad — have as a category proven more interesting and more capable with each passing year. According to a report from mobile manufacturer Ericsson, by 2015 80% of people accessing the Internet worldwide will be doing so from a mobile device. At the 2011 Mobile World Congress, Google CEO Eric Schmidt reaffirmed the prediction by revealing that for every baby born, 30 Android phones are activated. Mobiles are generally well understood by museums; there has been a significant amount of time spent finding creative ways to incorporate them both in the physical space and as a tool to help patrons stay connected to exhibits from a distance. The utility of mobiles in the museum has become very apparent, if not ubiquitous quite yet. Museum professionals continue to explore ways to best showcase rich content on small-screen devices, even as discussions around the use of mobiles in the galleries remain common. Also remaining are infrastructure issues that need to be resolved in buildings that were never designed to accommodate wireless technologies.

## **Time-to-Adoption: One Year or Less**

### **Tablet Computing**

In the past year, advances in tablet computers have captured the imagination of educators and museum professionals around the world. Led by the incredible success of the iPad, which in 2011 was selling at the rate of more than 3 million units a month, other similar devices such as the Samsung Galaxy and Sony's Tablet S have also begun to enter this rapidly growing new market. In the process, tablets (a form that is distinct from tablet PCs) have come to be viewed as not just a new category of mobile devices, but indeed a new technology in its own right, one that blends features of laptops, smart phones, and earlier tablet computers with always connected Internet, and thousands of apps with which to personalize the experience. As these new devices have become more used and understood, it is clear that they are independent and distinct from other mobile devices such as smart phones, eReaders, or tablet PCs. With significantly larger screens and richer gestured-based interfaces than their smartphone predecessors, they are ideal tools for sharing content, videos, images and presentations because they are easy for anyone to use, visually compelling, and highly portable.

## **Time-to-Adoption: Two to Three Years**

### **Augmented Reality**

Augmented reality, a capability that has been around for decades, is shifting from what was once seen as a gimmick to a tool with tremendous potential. The layering of information over 3D space produces a new experience of the world, sometimes referred to as “blended reality,” and is fueling the broader migration of computing from the desktop to the mobile device, bringing with it new expectations regarding access to information and new opportunities for learning. While the most prevalent uses of augmented reality so far have been in the consumer sector (for marketing, social engagement, amusement, or location-based information), new uses seem to emerge almost daily, as tools for creating new applications become ever easier to use. Specifically in the museum sector, AR provides patrons the opportunity to see how something is being done instead of listening to a docent’s explanation. As AR technologies and platforms become more readily available and affordable, museums will see the use of augmented reality and 3D technologies increase dramatically. As this happens, museums will need to consider how the level of immersion offered to patrons can balance against the desire of many visitors to have a quieter experience.

## **Time-to-Adoption: Two to Three Years**

### **Electronic Publishing**

Now that it is firmly established in the consumer sector, electronic publishing is beginning to demonstrate capabilities that challenge not only traditional workflows, but also the boundaries between print and digital, still image and video, passive and interactive. For many museums, electronic publishing is seen as a way to trim costs — glossy printed books are expensive to produce and only sell in small quantities — but electronic publishing offers museums much more than fiscal savings. Modern digital workflows support traditional print, digital, web, video, and even interactive content. The idea is that building in the full spectrum of potential publishing avenues — print, web, video, tablets — from the beginning not only is a way to streamline production, but also to increase the reach of the materials produced by leveraging the content over a wide range of media. Modern media companies have been the vanguard of this conversion — magazine writers, for example, will produce a piece that will work in the magazine, on the web, and in video — and that may appear in any or all of those outlets. The reason electronic publishing resides on the mid-term horizon is because museums and publishers have not yet resolved all the issues with supplementary images and legal obligations.

## **Time-to-Adoption: Four to Five Years**

### **Digital Preservation**

At the most basic level, digital preservation refers to the conservation of important objects, artifacts, and documents that exist in digital form. As technology continues to rapidly evolve and new software is propelled into mainstream use nearly every day, older tools and applications quickly become obsolete, all too often rendering files created with them unreadable. Museums have vast amounts of electronic media in their collections, and each one represents a unique challenge from a conservation standpoint. While museums have long employed art historians with specialties in artifact preservation, there is now the looming issue of finding professionals who understand preservation from a computer science perspective. Just like ancient objects, digital objects can be fragile and require special care, and the museum sector's growing dependence upon changing technologies puts these digital items at great risk. As museums, universities, libraries and other organizations start to support and develop processes and resources for digital preservation, a new science and toolset is emerging to support and inform the work.

## **Time-to-Adoption: Four to Five Years**

### **Smart Objects**

A smart object is simply any physical object that includes a unique identifier that can track information about the object. There are a number of technologies that support smart objects: radio-frequency identification (RFID) tags, quick response (QR) codes, near-field communications, and smartcards are some of the most common. Objects that carry information with them have long been used for monitoring of sensitive equipment or materials, point-of-sale purchases, passport tracking, inventory management, identification, and similar applications. RFID tags and smartchips "know" about a certain kind of information, such as temperature, color, pressure, or humidity — or how much money is available in a user's account and how to transfer the correct amount to a retailer for a given purchase — or which book is being checked out at a library, who the patron is, and whether that patron has any currently overdue materials. Smart objects connect the physical world with the world of information and will power the "Internet of Things". They can be used to digitally manage physical objects, track them throughout their lifespan, alert someone when they are in danger of being damaged or spoiled — or even to annotate them with descriptions, instructions, warranties, tutorials, photographs, connections to other objects, and any other kind of contextual information imaginable.

## Key Trends

**Increasingly, visitors and staff expect a seamless experience across devices.** Whether viewing curated galleries centered around objects and ideas or making a virtual visit to a museum's website, visitors expect museums to provide content. More and more, patrons want the experience of interacting with that content using the device of their choice, wherever and whenever they choose to do so. Virtual visitors in particular expect to be able to perform certain tasks online, and to be able to accomplish them on the device of their — and not the museum's — choosing, but this is increasingly true of visitors to the physical space as well.

**Collection-related rich media are becoming increasingly valuable assets in digital interpretation. Museums are beginning to see the value in developing formal strategies for capturing high-quality media documentation at every opportunity.** Working more closely than ever with educators and researchers, museums are embracing the opportunities provided by rich media to enhance multimodal learning both online and in the galleries. Video, audio, and animations are no longer seen as afterthoughts in interpretation but increasingly as necessary components of an interpretive plan. This trend is beneficial to museum professionals and visitors alike as it encourages a deeper understanding of objects, ideas, and audiences.

**The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.** Access to educational materials of all kinds has never been so easy or so open as it is today, and this trend is only increasing. The model of the museum curator or museum educator who stands in front of an object and interprets meaning for a passive audience is simply no longer realistic in this world of instant access. Museum professionals must respond by changing their roles to reflect the new need to guide and coach visitors in finding, interpreting, and making their own connections with collections and ideas. Museums must also be more willing to see themselves as learners, taking advantage of user-generated content to enhance the overall understanding of collections.

**There is a growing chorus of voices advocating a more active role for visitors in shaping what museums do.** As people become accustomed to tools that allow them to do things that previously required a great deal of expertise (eg, video editing, or publishing to the web), they begin to appreciate the creative skills involved in actually producing science or art or the like. "Makers" are an emerging category of museum visitors who want to not only appreciate what they see in historical or other contexts, but to also understand how it was created. Increasingly, visitors want to have an experience that they are part of, not one that they passively watch. "Maker" experiences which engage visitors of all ages in individual and collective experiences of tinkering, making, and discovery are a growing trend, and there is a role for museums in supporting and encouraging such experiences.

**Digitization and cataloguing projects continue to require a significant share of museum resources.** Museums are distinguished by the content they keep and interpret. There is an increasing understanding among museum professionals that visitors expect to be able to readily access accurate and interesting information and high-quality media. This requires museums to plan strategically for the digitization and cataloging of collections. These projects frequently require sacrifices in terms of scarce resources (money, personnel, and time) in order to meet long-term goals.

**Expectations for civic and social engagement are profoundly changing museums' scope, reach, and relationships.** More and more, museums are integrating emerging technologies and approaches such as social media, open content, and crowd sourcing as a means of engaging their communities both internally and externally on a deeper level. Embracing these innovations means that museums are providing patrons with more immersive opportunities to become part of the art. Suddenly, people who live far away from the museum are able to access its collections and respond and contribute to

them as well without ever stepping foot in the physical space. This is redefining what it means to be a museum patron. In this respect, museums are being more open and social places.

## Significant Challenges

**Collection-related rich media are becoming increasingly valuable assets in digital interpretation.** Museums are beginning to see the value in developing formal strategies for capturing high-quality media documentation at every opportunity. Working more closely than ever with educators and researchers, museums are embracing the opportunities provided by rich media to enhance multimodal learning both online and in the galleries. Video, audio, and animations are no longer seen as afterthoughts in interpretation but increasingly as necessary components of an interpretive plan. This trend is beneficial to museum professionals and visitors alike as it encourages a deeper understanding of objects, ideas, and audiences.

**Museums need to create digital strategies for long-term institutional sustainability.** Creating a digital strategy is critical for institutions today, and is only one part of a comprehensive digital strategy, which should also include e-marketing, e-philanthropy, revenue generation, digitization, digital preservation, and issues with regard to general technology infrastructure. Digital learning has linkages to many of these other areas of museum operation. As technology continues to evolve, museums must embrace new approaches to maintain its communities and attract a new generation of patrons.

**Funding for technology projects, even those for interpretation and exhibition, continues to fall outside core operational budgets.** The recent recession virtually brought to an end what had been a promising trend in museums allocating ongoing operational funds (as opposed to capital or project funds) for both experimental and ongoing technology projects. Museums need institutionalized strategic planning initiatives for technology infrastructure and technology-related projects, and information technology staff need better skills and opportunities to communicate the importance of a proper digital strategy. Open lines of communication and a common vocabulary might give administrators a clearer understanding of exactly what should be operationalized rather than left to project funds.

**Boards of Trustees and executive management too often do not recognize the importance of technology in generating financial or mission return on investment.** Integrating and recognizing the role of technology in garnering visitors, keeping their interest, and in financial support of the enterprise is critical to every museum's success in the world today. There is a prominent fear amongst Boards of Trustees and executive management teams that the cost of investing in emerging technologies (training, implementation, etc.) will not be repaid. However, practical and creative applications such as distance learning courses, digital collections, apps, and more have the proven ability to generate new audiences and new revenue streams.

**In many cases, museums may not have the necessary technical infrastructure in place to realize their vision for digital learning.** In the United States alone there are close to 17,000 institutions that self-identify as museums; many of these institutions have few staff and fewer resources. While it is practically impossible not to recognize the value of digital learning in today's connected world, the reality for museums is that the vast majority of institutions do not have the necessary technical infrastructure to successfully pursue goals for digital learning, and often have little time to dedicate to articulating, much less realizing their vision. Museums that do have resources may have to choose to reallocate funds from non-digital education efforts in order to implement the necessary technical infrastructure.

**Greater understanding of the relationships and synergies between onsite technology, offsite technology use, and online access to museum resources is needed.** Many in museum administration still fail to grasp the notion that a virtual museum visitor is indeed a museum visitor

and that our audiences have high expectations with regard to online access to services and information. It is often difficult enough for museums with scarce resources to serve their physical visitors and to keep audiences in their geographical region satisfied; the notion that museums must, in addition, provide information and services to the entire world is often too big a project to contemplate. Museums need help to better understand these mutable relationships.

**Improving our ability to measure impact using new digital technologies is a critical need.**

Museums are good at traditional program evaluation, but determining the impact of new technologies on knowledge, attitudes, skills is more challenging, especially when museum educators are attempting to measure the success of technologies that are unfamiliar to them, are a part of the standard tool-kit to the digital native. In order to improve our ability to measure, we need to be willing to learn as well as to teach.

