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# IV. KEY ISSUES

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During this portion of the forum we will start by trying to get ideas out on the table by having each person first address the discussion questions. We will then try to "bin" the ideas into categories. • Rob Semper, Executive Associate Director, Exploratorium

## A. Goals/Overarching Issues

### Why do this? Does it fundamentally add to what we're doing?

- One question I think we all have to ask is why – why are we doing this? Is it just because the stuff is out there and we're hip and cutting edge, or is this adding something fundamentally? • Daniel Molitor, Consultant

### Return on investment - ours and our visitors

- One thing that concerns me is will it always be a significant investment on the part of the users to make it work? Will return on our institutional investment in terms of time, content, and development be on a level that is only usable by larger institutions, or will we end up producing something great and then larger institutions like Disney say "Thanks," and go in that direction? Or do we realize in the end that really the way to do what we're trying to accomplish is to give teachers clipboards which gets us ninety percent of the way there with ten percent of the investment? We need to be honest about this. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

### Ubiquitous versus portable

- I have heard some very interesting questions regarding: What is this for? Why are we developing this? I would like to come back to a more basic simple question about the how. I would like you to think about ubiquitous and portable computing.

With ubiquitous computing you would have the computing devices everywhere. You wouldn't carry them with you. You would find an appropriate location and presumably you would have the capacity for more computing power. Whereas with portable computing you clearly have a much more fragile, limited tool.

I wonder if, by not articulating the difference between portable and ubiquitous, we are not in danger of being captured by the gadget, by the portable. So clearly this is half a "how" question and half a goal question. • Goéry Delacôte, Executive Director, Exploratorium

### Discussion Questions

1. What aspects of using handheld computers in museums do you find most promising?
2. Which aspects concern you the most?
3. What unanswered questions do you have about using this technology in museums?

### Categories

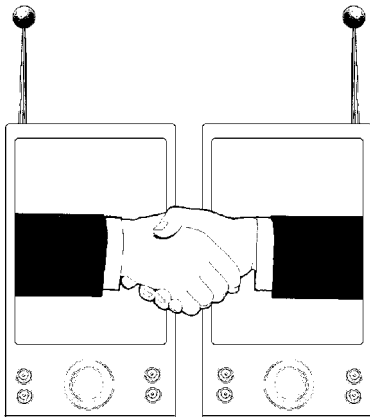
- Goals/overarching issues
- Audience
- Technology infrastructure
- User interface
- Content development
- Staffing and operational issues
- Research and Evaluation (visitor studies)

### The role of the museum in society

- What is the impact on the museum's goal? How does this technology affect the overall goal of how the museum wants to position itself as an institution in society? • Daniel Molitor, Consultant

### Potential for collaboration

- The collaborative possibilities that these projects pose are exciting. • Kristina Hooper Woolsey, Consultant
- That is something we have yet to talk about in this forum – the relationship between institutions. • Rob Semper, Executive Associate Director, Exploratorium



### Vertical or horizontal design and goals

- In various examples that were talked about today, models were linked to different goals. There was a vertical arrangement in which the electronic device is part of the design of an exhibit. In other examples, it was a horizontal arrangement, spanning across the whole museum so the visitor carries the device across different settings. This choice between the vertical and the horizontal might be something you want to do specifically rather than accidentally. • Jim Thornton, Member of Research Staff, Xerox PARC

### A museum-embedded design or a personal exploration tool?

- I am wondering whether these things should be designed for museums and embedded in the museum's philosophy and ideas, or whether it could be a notebook you bring with you and it changes the way you receive things and the way you collect things. For example, here at the Exploratorium you may gain ideas and information about color and light. Then you go to the San Francisco Museum of Modern Art and look at paintings involving color and light and you make connections between the two. • Susan Schwartzberg, Senior Artist, Exploratorium
- That's sort of inside-out or outside-in design. • Kristina Hooper Woolsey, Consultant

### Changing/expanding the role of the visitors

- It changes the role of the visitor. I felt that I can be a visitor, a curator, a researcher, a content provider. It changes and defines the role of the visitor. They can have specific roles when they walk around the museum and outside the museum because they have this tool in hand. • Andrea Bandelli, Museum Consultant

## B. Audience

### 1. Promise/Potential

#### Opening & enhancing the experience for people with different abilities

- For me the most promising aspect of this technology is its potential to somehow enhance the experience in the moment. The capability of recording and of planning ahead is certainly possible and may be valuable, but for me to open up, to enhance the experience in a way we wouldn't otherwise be able to do, particularly for people with different abilities, is the most promising. • Daniel Molitor, Consultant

#### Portability and multiple access - visitors develop their own vernacular

- The appeal is the portability and multiple access that gives me and visitors as much information as possible so that we can develop our own vernacular. • Melissa Alexander, Project Director, Origins, Exploratorium

#### The visitor as a VIP with a personalized experience

- One of the things we're hoping to see in terms of potential is to offer each visitor a VIP experience. We want to figure out how to make every visitor feel

like the place was set up for them each day. What are ways that we can add value to the experience. With a lot of what I've seen it seems like you could simply add a kiosk – the information is not unique to individual visitors. You could say, "I know you've seen this exhibit, so here are six others that relate to this exhibit." • Rachel Hellenga, Director of Exhibits, The Tech Museum of Innovation

### Visitors as curators

- I was at a Jackson Pollock exhibit at the New York Museum of Modern Art and started talking to a man who was seventy years old who was telling me about his memories of Pollock when he first became known, how there were Pollock-imitators. I like the idea of visitors contributing as opposed to staff – visitors as curators. • Jenna Burrell, Application Concept Developer, Intel Architecture Laboratories

## 2. Unanswered Questions

### Accommodating casual visitors

- How do we accommodate casual, drop-in visitors with one of these devices? • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

### Who is the audience?

- We're not asking who the audience is. Is it children, students, adults? • Margaret Pezalla-Granlund, Museum Consultant

### Audience goals vis a vis content, engagement, technology and space

- If we're going to look at how to meet visitors' goals we need to look at different kinds of content and ways of engaging them and the different goals you can accomplish with technology in that space. • Scott Beveridge, Internet and Multimedia Exhibit Manager, Museum of Science and Industry, Chicago

### How much training does the visitor require?

- This is a mundane issue and it involves training. How much is required? What can you assume about their knowledge and what are your expectations for your audience? • Mirjana Spasojevic, Project Manager, CoolTown Program, Hewlett-Packard Research Laboratories

### Staff-driven development or audience-driven development?

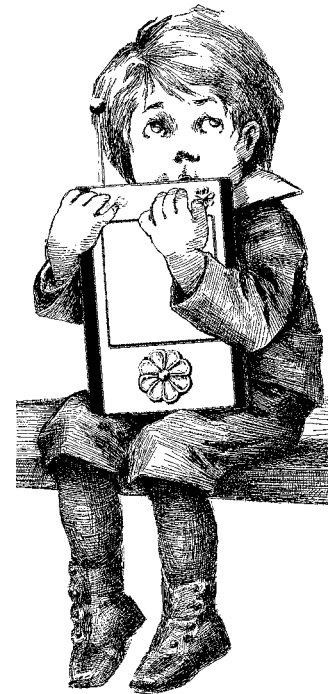
- When I'm teaching a class it's not because the classroom has cool little computers; it's because I have an interest in the subject I'm teaching, and I'm assuming with exhibit developers it is the same. I wonder how much the audience drives what is actually built and how much it is driven by our personal interests and expertise. • Michael Petrich, Co-Project Director, Playful Invention and Exploration Network, Exploratorium

### Visitor input – for content building or evaluation?

- Do we want to allow users to leave their stories behind so that there is a growing legacy of information, experiences, and insights? Or do we see it as an opportunity for evaluation – the visitor finishes an experience and we ask, "What do you think?" • Scott Beveridge, Internet and Multimedia Exhibit Manager, Museum of Science and Industry, Chicago

### Overlapping Issues From Other Categories

- Need to enable visitor input to content & the information base
- Does the technology create an isolated visitor experience?
- If we are profiling our visitors via these devices, does that raise privacy issues?
- How do the demographics of the audience affect the type of experience they'll have (age, gender, digital divide issues)?



### What impact does the age of the visitor have? Is it multigenerational?

- How is it different for kids than for adults? Is it multigenerational? • Susie Wise, Senior Producer Interactive Educational Technologies, San Francisco Museum of Modern Art

# C. Technology Infrastructure

## 1. Promise/Potential

### Information storage on the Web

- Something that was alluded to that is promising relates to the question of what you store locally and what you store globally. The Web can be a set holder. • Kristina Hooper Woolsey, Consultant

## 2. Concerns

### Variations in user Web configurations

- In terms of using the Web, don't expect the visitors to have a specific setup. Their Web setups will vary. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

### Rapid obsolescence of technology

- I'm concerned about the obsolescence of any component since we know that things change so much. I don't know how many of these Palm devices I've had. • Marcos Frid, Research Engineer, Hewlett-Packard Research Laboratories

### Maintaining the infrastructure

- There is the planning for resources to maintain this infrastructure. If you plan to have blinking lights and so forth for five years, you'll need people to maintain that. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

### Bandwidth capacity and scalability

- There are two concerns related to bandwidth. One is matching the amount of data I want to put onto the device to the actual device (dynamic content adaptation). The other, related issue is because of scalability – the user experience is going to be detracted if the user has to wait. • Marcos Frid, Research Engineer, Hewlett-Packard Research Laboratories

### Battery life

- I'm just going to say two words: battery life. • Margaret Fleck, Senior Researcher, Hewlett-Packard Research Laboratories
- The answer is also two words: boogey man. • Marcos Frid, Research Engineer, Hewlett-Packard Research Laboratories

### Security

- Another word is security. A lot of things are based on open standards. If you have a wireless network and people going through there, you don't want them in other parts of your system. If you're using a Palm you may not be able to prevent other people from seeing what is on your Palm. And if I have a Hewlett-Packard CoolTown development kit on my computer you may not be able to stop me from getting into your system. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

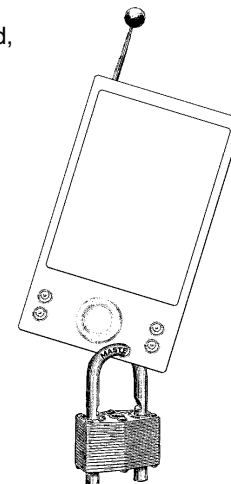
### Robustness and ergonomics

- And there are concerns about robustness and ergonomics. • Allison Woodruff, Member of Research Staff, Xerox PARC



### Privacy issues

- What about privacy? If we are profiling our visitors, aren't there privacy issues?
- Michael Drennan, Technology Developer, The Tech Museum of Innovation



## Language - other than English

- Language issues – other than English. • Deborah Lawrence, Manager Interactive Technology Audience Services, San Francisco Museum of Modern Art

## Task specificity - matching the technology to the goal

- I want to put in a plug for task specificity. If you look at what works – audio guides, for example – we may not like everything about them but they do work. They use the metaphors we live by now and they become appliances for their various processes. If we start with a general-purpose computing device, we tend to think about how there is a lot of stuff we can do with it. It goes back to audience goals and what we were calling “horizontal” versus “vertical” development – what a device is designed for. A system with lots of different functions may confuse people unnecessarily. • Paul Aoki, Member of Research Staff, Xerox PARC

## 3. Unanswered Questions

### Content development

- The question of how we develop content is also a technology and infrastructure question. • Susie Wise, Senior Producer Interactive Educational Technologies, San Francisco Museum of Modern Art

### Interoperability - across devices and across museums

- There is also the question of interoperability. If I have a customized device for someone with vision problems, I don't want to pick up a new device and have to reformat it each time. How can we make this interoperable, particularly if I want to compare them across museums. For example, I might want to compare the Van Goghs in three different places. • Margaret Fleck, Senior Researcher, Hewlett-Packard Research Laboratories

### Scalability and Capacity

- How can you have people using lots of networks simultaneously? It's a question of scalability and capacity. What happens when a lot of people use it all at once? • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

### Is the location finding technology worth the result?

- In talking about using bar codes for finding out where you are, there could be a research or evaluation benefit, but is the infrastructure worth it in terms of the visitor – to say “You are standing in front of this exhibit.” Or can we trust the visitor to know that they're standing in front of that exhibit? • Kristina Hooper Woolsey, Consultant

### Single or multiple users and adapting to the needs of specific museums

- We didn't talk about whether this is for one person or for several people and also about devices for different types of space. For example, a device for an art museum where they wouldn't want you pointing at a painting with a sharp object and they wouldn't want you getting close to the artwork. • Margaret Pezalla-Granlund, Museum Consultant

### Fixing what breaks

- Can we fix it if it breaks? • Michael Petrich, Co-Project Director, Playful Invention and Exploration Network, Exploratorium

### Networking across museums

- We haven't talked a lot about networks or about connecting institutions. We're focused on use of the device within our space, but connections are also interesting to grapple with. • Rob Semper, Executive Associate Director, Exploratorium

### A structure for managing input from visitors

- Can we create a structure for managing input from all of our visitors? • Deborah Lawrence, Manager Interactive Technology Audience Services, San Francisco Museum of Modern Art

### Relationship between device and infrastructure

- What is the relationship of the device and the network? • Rob Semper, Executive Associate Director, Exploratorium

### Devices that stimulate social interaction

- The work on the devices as part of the social process is exciting and the work related to that problem (e.g., whether one earpiece or two) is promising. • Kristina Hooper Woolsey, Consultant



### Overlapping Issues From Other Categories

- Portability & flexibility of content a plus
  - What works best: text, audio, or video?

### Avoiding technoisation

- One concern I have involves social interaction; how to avoid having people walk around with these devices like they do at Experience Music Project in Seattle, with headphones on, heads down – it's terrible. • Andrea Bandelli, Museum Consultant

## D. User Interface

### 1. Promise/Potential

#### Extending Your Capabilities, Tracking Who You Are

- One of the things shown with the probes is that there are devices that can extend your observational capabilities. Another thing I think is really promising is that you can create your own individual data. Most of us use notebooks. If there were some way to use this technology to keep track of what we've learned, to build data about who we are . . . • Kristina Hooper Woolsey, Consultant

#### Increasing interactivity with exhibits and information

- There is promise in things like Quicktime VR. There are good reasons why you can't touch objects or draw on paintings in an art museum. These devices can let you do that in the virtual realm. What if this painting was blue? You can try it and see. • Kristina Hooper Woolsey, Consultant

#### Live Content

- There is the notion of live content, in terms of having a live guide on hand. One thing that we did [at Port Discovery] because our device had messaging capabilities, was to send out live messages from the staff. It's an interesting tool to use, and it allows you to build capabilities on the fly. • Daniel Molitor, Consultant

### 2. Concerns

#### Enabling visitor input to the information base

- We need to build an active role for visitors. These devices give the visitors information. But here's very little opportunity for the visitors to give back information and as a visitor I have information to give. Otherwise, it puts me in a passive role. We need the visitors to contribute their own knowledge. In Amsterdam they had a system, not using handhelds but with computers on the floor, that had information from visitors, content you couldn't imagine. Visitors can build an amazing knowledge base. • Andrea Bandelli, Museum Consultant

#### Making the technology transparent and easy to use

- Another concern is how to make the technology transparent. It's strange to walk around a museum with these objects in your hands. How do we make them transparent and easy to use? • Andrea Bandelli, Museum Consultant

#### Technology interfering with experience

- What concerns me is the evil side of what I said about the potential for enhancing the audience experience; concern about technology getting in the way of the moment, interfering. • Daniel Molitor, Consultant

#### Barriers posed by the digital divide

- Obviously the issue of technology as a distraction is a big one. Another is systems that aren't user friendly. And there is the digital divide. If you are

technologically savvy you get lots of rich information, but if you're not technologically savvy you don't. • Jenna Burrell, Application Concept Developer, Intel Architecture Laboratories

### **Exclusivity of credit card security**

- I'm concerned about the exclusivity of having to leave a credit card to check out the handheld equipment. That's why I want a magic bracelet – something that can detect wherever you are but is cheap. There should also be some incentive for putting it back in a return bin – for example, you get access to your own Web site if you do. • Rachel Hellenga, Director of Exhibits, The Tech Museum of Innovation

### **Confusion between device, design, concept, content**

- A concern I have is that of confusing the devices with the general problem. You need some kind of general theory. In the old MIT Media Lab days we talked about a movie of the world versus the real world. You need to think about that. • Kristina Hooper Woolsey, Consultant
- For ideal design you need a general theory of the problem. It has to do with maps and territories – what are the schema you use to deal with the data? • Rob Semper, Executive Associate Director, Exploratorium
- And you need to think about the appropriate use of technology. If you need good recognition and a large screen, don't use a handheld device. Given the maze of technologies, which one should you be using? • Kristina Hooper Woolsey, Consultant
- It was interesting in the SFMOMA presentation, seeing people going around with an iPAQ and standing in front of a huge canvas while looking down at this tiny person on the screen talking about the canvas. It was very strange. There is something about all of these dimensions that is very intriguing. • Rob Semper, Executive Associate Director, Exploratorium

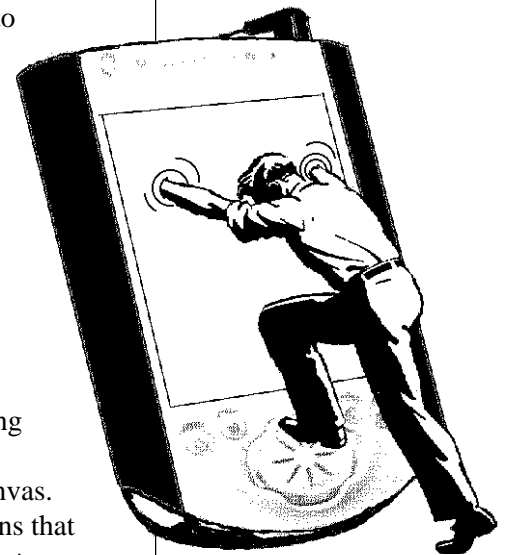
## **3. Unanswered Questions**

### **Different applications for different settings or one intuitive approach that works for all?**

- One thing that concerns me is versatility. The SFMOMA device was really easy to use, and I loved playing with the Concord Consortium probe. I felt like I was really doing science, but the interface felt like a scientific paper. Is there one way that is intuitive for all visitors or will we struggle with different applications for different settings? Is there a universal, intuitive approach? • Melissa Alexander, Project Director, Origins, Exploratorium
- Since the idea of an intuitive design for the general population came up, I'm going to put out that it's not clear there is an intuitive basis for design, because our intuition is based on our experiences. When we visited and saw the CoolTown/Exploratorium demo, we had a curator who just got a computer and it wasn't at all clear to the curator that you click on things – something that would be clear to a computer user. • Jim Thornton, Member of Research Staff, Xerox PARC

### **Display quality**

- Display quality, so you can see outside in different, and difficult, lighting conditions. • Allison Woodruff, Member of Research Staff, Xerox PARC

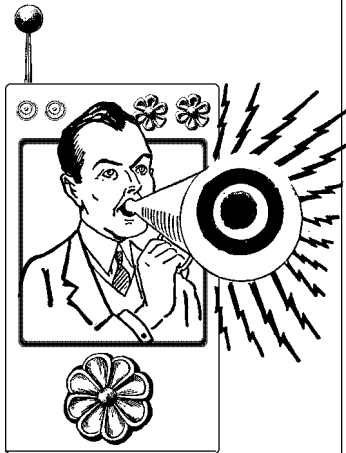


### **Age and gender needs**

- I also wonder how age and gender fit into the question of whether you can develop one universal intuitive approach. • Melissa Alexander, Project Director, Origins, Exploratorium

### **Ubiquitous computing or highly mediated?**

- Are we talking about ubiquitous computing or highly mediated experiences? • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation



### A uniform user interface for different systems?

- The stuff we're doing can be represented not just on a handheld device, but on larger systems too. How do you design a user interface for different systems? • Stephen Bannasch, Director of Technology, Concord Consortium
- And specifically for a handheld system versus a system with a full screen. • Natalie Rusk, Project Director, Electronic Guidebook Project, Exploratorium

### Voice or personality of the content

- There is the question of voice or personality of the content. Will it be the omniscient voice of the museum or will it be something more personal. I find the idea of using an owl as a device character fascinating [*see Related Projects and Information section of this document*]. We did some that were generic and at other times used characters. It is a question of how it affects the information, which is an issue for museums in general. • Daniel Molitor, Consultant

### Overlapping Issues From Other Categories

- Need a user interface that allows for visitor as content developer - visitor input to content and information base.
- Can we use this technology to develop tailored, personalized content for visitors?
- Can we use this technology as an ongoing log to develop data about what we've learned and who we are?
- Are we confusing design of the device with design of content. What is our overall schema? What is the relationship between the technology and the content?
- Whose passions, interests, needs drive the development process? Is it staff-driven development or audience-driven development?

## E. Content Development

### 1. Promise/Potential

#### Potential for flexibility in content

- There is the potential of flexibility. If we use open standards, by pulling up Web pages you can use content that's there or use new content. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

#### Developing customized content for the moment (and beyond)

- Regarding customization of content, it's also what people want at a particular moment. • Deborah Lawrence, Manager Interactive Technology Audience Services, San Francisco Museum of Modern Art
- Can it also be customized content for different times? • Melissa Alexander, Project Director, Origins, Exploratorium

#### Designing in the space between the real and the virtual

- The Electronic Guidebook presentation showed a chart of a visitor moving between the physical and the virtual world and the ways we interact between those two. Because the devices connect these two worlds, it gives us a way to design in that space. • Kristina Hooper Woolsey, Consultant
- We don't understand what happens in that space. There is a mental shift in your head when you are navigating between the virtual and the physical. • Rob Semper, Executive Associate Director, Exploratorium

#### Information you can't get from a museum catalog

- I think the Louise Bourgeois video used in the SFMOMA project was amazing, watching her crawling around her studio as she comes to the conclusion about spiders and her mother. That's not what you'd get from a didactic brochure. • Margaret Pezalla-Granlund, Museum Consultant

### Tailored experience, repeat visits and building on previous experience

- I would like to read this quote from the Experimentarium, Denmark (<http://www.experimentarium.dk/uk/pressecenter/pressemeddelelser/sonofon.html>):

*The idea behind the new service is to take SMS seriously. Our goal is to give each individual Experimentarium visitor an experience that is adapted to his or her personal interests. The Experimentarium is to be a kind of personal servant to the visitor, suggesting various activities and reminding the visitor of displays and activities experienced during previous visits. The long-term perspective is to offer intelligent exhibitions where visitors can recall and reuse previous experience. The 'Future Body' exhibition was the first step in this direction. - Project Manager Mads Hammerich of the Experimentarium.*

There is also the idea of reminding people to come back for repeat visits through their mobile phones. • Andrea Bandelli, Museum Consultant

### Diverse spatial experience and connections via virtual and real

- There were two things that were interesting from the Port Discovery, Blackberry pager presentation. One was the diverse spatial experience with people in different rooms. Then there was the idea of people working on the handheld and in real space, and the connection that occurs because of working with both. Developing content for these two would be interesting.
- Susie Wise, Senior Producer Interactive Educational Technologies, San Francisco Museum of Modern Art

### Interactive material on the space between the virtual and the real

- There should be development on interactive material between the content and the activity, on the environment that pushes back and forth between the two. • Kristina Hooper Woolsey, Consultant

### Commercial potential for link to museum sales

- This is a mercenary idea that no one has mentioned – that of going around to exhibits you like and finding out about things that are related to the exhibit that you can buy at home. For example, something I could build at home. Here at the Exploratorium you have the *Snackbooks* that people can buy. • Stephen Bannasch, Director of Technology, Concord Consortium

## 2. Concerns

### Information versus process skills

- There is a difference between conveying information and process skills. It's not just information on plate tectonics, but the context for integrating that information that we pride ourselves on at our museum. • Michael Schiess, Project Manager, Physical Science Interpretation, Museum of Science, Boston

### A base for further learning

- I'd like to throw in an idea. Within these devices you could use the exhibit as a base for more formal learning, or it could be self-taught learning. • Rob Semper, Executive Associate Director, Exploratorium
- Or for people who work with teachers – you could do a project and then come to the museum to continue the project. • Stephen Bannasch, Director of Technology, Concord Consortium



### Age, Different Abilities, Language

- You could just copy the concerns expressed in other categories concerning age, ADA, and language. • Margaret Fleck, Senior Researcher, Hewlett-Packard Research Laboratories



### Who is developing content - exhibit developers or software people?

- I have a question related to the recent wave of Web sites in the museum field. Who is developing these things? Probably not an exhibit developer. Is it a Web site designer? This relates to who is creating these things. • Michael Petrich, Co-Project Director, Playful Invention and Exploration Network, Exploratorium

### Need for software exhibit developers can use

- I think it's also about having the technology with software. If it's there then the exhibit designer can do it. It made a huge difference to us to be able to do it ourselves rather than farm it out. • Daniel Molitor, Consultant

### Visitor involvement in inputting and processing information

- I'd like to extend that idea of process further. For people doing more involved work, I think in terms of their ability to do projects or research; to be able to keep track, organize, use this as something of value. I want kids to be able to tell stories about what they've done (and stories turn into research papers). It is a matter of making sure that the idea of content isn't just what the museum develops. It may be as simple as user-added data. For example, there's an exhibit upstairs here at the Exploratorium that measures hearing. I wanted to be able to enter my age, see scatter data relating to how my hearing compared to those older than me and those younger than me. • Stephen Bannasch, Director of Technology, Concord Consortium

### Maintaining content with idiosyncratic charm

- Here at the Exploratorium, I was talking to Natalie about the idiosyncratic information you have about people who developed exhibits or use the exhibits. I wonder how you get to do a project that is idiosyncratic and playful in a museum with limited staff and time when so many high expectations are riding on it? • Margaret Pezalla-Granlund, Museum Consultant
- We have a real question about moving beyond the research project to implementing this in the field in a systematized way. • Rob Semper, Executive Associate Director, Exploratorium
- This is a matter of the developers making sure that the tools we're developing have the capability of expressing idiosyncratic stuff. In the kind of work I do, designing an exhibit with this in mind, I would be designing with a handheld device in mind. From the art museum perspective, people like to hear the artist talking about his or her work. What if the artist was involved in designing the handheld interaction? • Stephen Bannasch, Director of Technology, Concord Consortium

### Separation/communication between visitor content and research content

- There is the danger of two content streams – general visitor content versus research content. Since it is directed at two different audiences it's likely done by two different sets of people: research content by researchers, and visitor content by curators or exhibit designers. Make sure that the two groups talk to each other. • Margaret Fleck, Senior Researcher, Hewlett-Packard Research Laboratories

### Maintaining, upgrading, renewing content

- In discussing the technology infrastructure we noted that there is maintenance and cost down the line. That is similar in content as museums move exhibits, create new exhibits, and so forth. • Jim Thornton, Member of Research Staff, Xerox PARC
- That also has to do with timeliness. For example, for science museums or medicine, content like Web sites goes stale. It impacts on the relevance to visitors. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

### 3. Unanswered Questions

#### Choosing content and format (text, video, audio)

- I have some content questions and concerns before the next phase of the Electronic Guidebook. I wonder how others working with handhelds chose the stories you did; how you chose the content. And I also have questions about the format. Has there been any testing or exploring of sound versus text versus video? • Katherina Audley, Content Developer, Electronic Guidebook Project, Exploratorium

#### Layer on top of old exhibits or start from scratch?

- Can this be successfully layered on top of existing exhibits and experiences or do you have to design for this starting at the beginning of new exhibits? Should you do it only with new stuff working forward, or can you do it for the 280 exhibits you already have on the floor? That question is applicable to a wide range of other channels, including how you approach floor activities and educational activities. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

#### Shaping new knowledge or conserving old knowledge?

- I was wondering about the same question at four this morning. Is this a tool for innovation of knowledge, for changing and shaping knowledge, or for the conservation of already acquired knowledge? After listening to the various projects, some fit into one category and some in another. • Melissa Alexander, Project Director, Origins, Exploratorium

#### What information - how do we select the interesting & engaging?

- All of my comments are about information and about cylinder seals – an ancient device for imprinting a seal using inscribed cylinders that are one to two inches long. In my last job I found that even though there was this big catalogue about cylinder seals most of the information was not interesting in any way. My job was to pull out interesting or engaging information. My point is that there is a lot of information out there. What is it we want to be using? • Margaret Pezalla-Granlund, Museum Consultant

#### Relation to standards and benchmarks

- Museums are under increasingly more pressure to align what they are doing with state standards, benchmarks, and so forth. How do handhelds tie in with standards and benchmarks and state curriculum issues? I think some interesting things could be done. • Michael Schiess, Project Manager, Physical Science Interpretation, Museum of Science, Boston
- Mike Petrich brought up the question earlier about who drives the development. That question should also be under content, especially if we're talking about standards. • Margaret Pezalla-Granlund, Museum Consultant

#### Depth and nature of content - mediated, new, repackaged

- To what level of thought can we go with the content? For example, do we include complicated scientific papers? A second question is how much do we need to mediate the content? How much original material will there be, how much mediated, and how much repackaged? • Andrea Bandelli, Museum Consultant

#### Capacity for Creating New Content, Scavenging Old Content

- One question I'm worried about is how we are going to create this content – from a language standpoint, let alone anything else. A lot of museums I go to haven't touched the exhibit labels in fifteen or twenty years. Also, is there a way to scavenge content that already exists? Can we at least get existing content out? The question is how to create content. • Margaret Fleck, Senior Researcher, Hewlett-Packard Research

### What is the previsit?

- An unanswered question I have is what would a previsit look like? • Rachel Hellenga, Director of Exhibits, The Tech Museum of Innovation

### Copyrights and ownership of intellectual property

- How will we deal with the issues of intellectual property, copyright, usage? • Daniel Molitor, Consultant

### Sharing content and communication between institutions

- My copyright question is related to another question about sharing of content. If there are multiple institutions doing this around town, can they talk to each other? • Daniel Molitor, Consultant

## F. Staff and Operational Issues

### 1. Concerns

#### The range of skills needed by developers

- There is a range of skills needed by the developers (Flash, programming, HTML, etc.). This relates to another comment about some technology only working well on certain screen sizes. Obviously you want those who are doing the development to have as wide a range of skills as possible. • Eamonn O'Brien Strain, Research Scientist, Hewlett-Packard Research Laboratories
- You want to write the material once, but want to be able to read it on any device. You have to figure that out before you embark on it.. • Ron Hipschman, Senior Media Specialist, Webmaster, Exploratorium

#### Security issues when taking visitor credit cards

- We found that when visitors were checking out devices we were concerned about the potential for staff manning that station taking down visitor credit card information when there was a computer right there. • Daniel Molitor, Consultant

#### Adequate staffing, commitment, and team work

- I have a concern that has to do with building teams and taking responsibility for achieving goals. A colleague and I came up with the formula: 10% of 10 staff members' time = 0% FTE. The point is that the project will not move forward if people have a ten percent stake in the project. They need at least fifty percent or more. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

#### Staff training

- The staff will need to be trained as well. • Anon

#### Device distribution on floor and front line staff overload

- Who is responsible for maintaining distribution of these devices to visitors, collecting the devices afterwards, etc.? People will say, "Wait a minute, the front line staff is already overloaded." This is time consuming and will need to involve more than the traditional front line staff. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation



### Equipment & technology maintenance

- Who is going to maintain this? What happens when a device is dropped? • Melissa Alexander, Project Director, Origins, Exploratorium
- There's the issue of having equipment to replace the equipment as it goes down, having spares, and the ability to clean the equipment. • Deborah Lawrence, Manager Interactive Technology Audience Services, San Francisco Museum of Modern Art

## 2. Unanswered Questions

### Impact on docents

- In our museum we have been a heavily docent-led museum. I wonder how this changes the role of the docent and whether the visitor has options concerning using a docent or a handheld device. Also, does it interfere with the docents if they are trying to lead a tour and people with handheld devices come up? • Tom Steller, Chief Curator, Natural Sciences, Oakland Museum
- I think it's also an opportunity – we shouldn't always see it as competing with docents. This could be a conversation provoker that gets you speaking to docents. • Natalie Rusk, Project Director, Electronic Guidebook Project, Exploratorium
- We have sixty-five interpreters in a program I work with. We hope to use the model of docents using handhelds with visitors. • Michael Schiess, Project Manager, Physical Science Interpretation, Museum of Science, Boston

### Visitor paths through space and the multiple roles of docents

- I have some issues that have to do with staffing. In different museums there are different ways that people go through the museums. Here it's very random, you may want an interface by the exhibit. In others there could be a path, or you have very big spaces, like the Louvre. How do visitors float through space and what role do docents play? In some museums they double as security guards. What were docents doing besides providing content? And what about crowd control issues? • Margaret Fleck, Senior Researcher, Hewlett-Packard Research Laboratories

### Protocols for collaboration with research institutions

- These types of projects often involve collaboration with research institutions. How do we operate in that mode? • Michael Petrich, Co-Project Director, Playful Invention and Exploration Network, Exploratorium
- Is there a business model? My point is whether there are business models, in audio guides for example, that would make sense here – models for developing in partnership rather than in-house. • Jim Thornton, Member of Research Staff, Xerox PARC

### Integration with the institution's network & operations

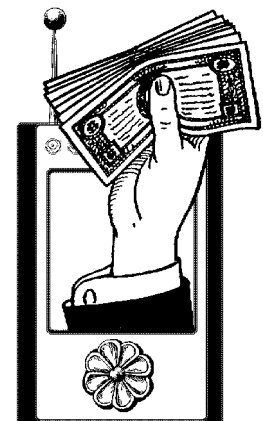
- In addition to maintenance there's the question of how to integrate this into the network of the institution. • Ron Hipschman, Senior Media Specialist, Webmaster Exploratorium
- Are there opportunities to integrate this with ticketing and the call center? • Scott Beveridge, Internet and Multimedia Exhibit Manager, Museum of Science and Industry, Chicago
- There could also be integration with the museum store, which doesn't have to go to the Disney level. • Margaret Fleck, Senior Researcher, Hewlett-Packard Research Laboratories

### Marketing opportunities relating to branding or business model?

- Are there marketing opportunities related to branding? Things that could affect the business model? • Daniel Molitor, Consultant

### Can this be used to increase staff communication?

- Can it be used internally to increase communication among staff members, especially between floor staff and office staff? • Andrea Bandelli, Museum Consultant



### How do you make this a permanent a permanent part of your budget?

- There's special budgeting the first time you do a project like this, but how do you make it a permanent part of your budget? • Margaret Pezalla-Granlund, Museum Consultant
- And how do you fund evaluation as well? • Susie Wise, Senior Producer Interactive Educational Technologies, San Francisco Museum of Modern Art

## The human life of institutions

- How does this relate to the human life of institutions? • Anon

## Who is responsible for updating as exhibits change?

- The idea came up earlier that exhibits move or are taken off the floor. You could create a networked data base that helps everyone in the museum know the status and locations of exhibits. • Natalie Rusk, Project Director, Electronic Guidebook Project, Exploratorium

## Overlapping Issues From Other Categories

- What works best: text, audio, or video?
  - Does this isolate the visitor?
  - Does this enhance the visitor experience?
  - How do gender, age, economic class of the audience affect the experience?
- Does this help address the digital divide or does the digital divide have a negative impact on audience ability to benefit from the experience?
- What happens in the mental shift between the virtual and the physical?

# G. Research and Evaluation (Visitor Studies)

## 1. Promise/Potential

### Gathering and using visitor information

- I see museums as an environment with hundreds of people coming through and we never have any idea what information they have to offer or what their opinions are. These electronic guides offer a way to gather information and feedback that can be used for rating exhibits and for making associations between exhibits. • Jenna Burrell, Application Concept Developer, Intel Architecture Laboratories

## 2. Concerns

### Visitor privacy and ethical issues regarding data collection

- Though these systems can collect a lot of data about user movement and so forth, what data should you collect and is it ethical? Even if you don't share the data with anybody else, you've got it. • Scott Beveridge, Internet and Multimedia Exhibit Manager, Museum of Science and Industry, Chicago
- There is the issue of privacy which relates to industry standards and individual comfort level. • Rachel Hellenga, Director of Exhibits, The Tech Museum of Innovation

## 3. Research & Evaluation Methods, Approaches

### Accessing the data

- How do you get access to the data that exists? • Anon

### Building on, feed back into, the existing knowledge and research base

- I hope you look hard at how to develop research tools that build on what is already being researched; that you build on or link to what is already known or has already been researched about nonnomadic visitor experience. How can we build on visitor experience in informal learning environments and feed back into that knowledge base so that we are improving practice and building knowledge all around? • Kathleen McLean, Director, Center for Public Exhibition, Exploratorium

### Using online marketing research techniques

- Not much is known about user research of online materials but online market-

ers have data on everything from who is using it to demographics. So one idea would be using marketing research techniques to understand audience use of materials. • Rob Semper, Executive Associate Director, Exploratorium

### Feeding into exhibit design

- A lot of this would be useful in exhibit design. • Stephen Bannasch, Director of Technology, Concord Consortium

### Developing a language for the research

- I keep thinking about case studies. We seem to be very much in the mode of “Does this situation work?” As this matures we’ll see categories of intentions and categories of place. At this point we don’t have much language for this, we’re pretty primitive. • Kristina Hooper Woolsey, Consultant
- We’re in the process of developing the taxonomy, of seeing the patterns. • Rob Semper, Executive Associate Director, Exploratorium

### Research methods for fields that haven’t existed before

- There is an existing field of research and evaluation. I’m curious whether there are existing techniques that provide methodologies for fields that haven’t really existed before. • Doug Conaway, Resource Development Director, Center for Media Communication, Exploratorium

## 4. Research/Evaluation Questions

### Does this stimulate understanding and inquiry?

- I have an evaluation question – to what extent does this stimulate understanding? To what extent does it stimulate inquiry? • Michael Schiess, Project Manager, Physical Science Interpretation, Museum of Science, Boston

### Does it enhance retention?

- I would like to know if using this technology enhances retention of experience or knowledge after they leave the museum. • Marcos Frid, Research Engineer, Hewlett-Packard Research Laboratories

### The validity of the previsit experience?

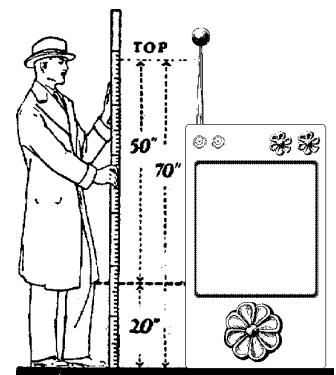
- That would also be a research topic – the validity of the previsit experience, or do you want the experience to be experienced cold when visitors walk in the door? • Daniel Molitor, Consultant

### What are the indicators of success regarding visitor experience?

- Everyone here wants to deepen and extend visitor experience with the exhibits using the gadget. But does extended time at an exhibit necessarily indicate a deeper level of interaction? It is possible that visitors might spend more time at an exhibit using the gadget but their time may have been spent dealing with technical difficulties and what they remember primarily of their museum experience could be the difficulty they had with the technology. • Katherina Audley, Content Developer, Electronic Guidebook Project, Exploratorium

### Capturing data before you know the research questions

- I have a concern about capturing data. We start designing these systems without knowing what the research questions are, so you need to make sure that you capture enough data to recreate the situation. • Mirjana Spasojevic, Project Manager, CoolTown Program, Hewlett-Packard Research Laboratories

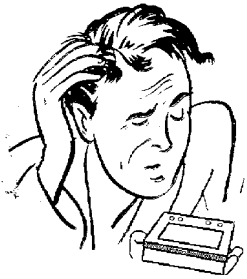


### What impact will data collected about visitors have on the museum ?

- How does the knowledge about the people who come to the museum and how they move about the museum influence the museum itself and the way the museum is organized? • Marcos Frid, Research Engineer, Hewlett-Packard Research Labor

### Usability issues

- There are also usability issues • Paul Aoki, Member of Research Staff, Xerox PARC



### How much can users contribute to content?

- I think it's important to look at the contribution of users and ask what you can expect from them. Learning how to input is not easy. • Jenna Burrell, Application Concept Developer, Intel Architecture Laboratories

### Classes of users

- There are a lot of classes of users: students, teachers, walk-ins. We need to think in terms of different classes and how they use this in different ways, both pre- and post-visit. • Ron Hipschman, Senior Media Specialist, Webmaster, Exploratorium

### Portable versus fixed

- In terms of different modes, my sense is that there is a lot of research on the use of video, audio, and text in fixed installations. The lessons will be different for a handheld because it's portable. • Paul Aoki, Member of Research Staff, Xerox PARC

### How does personalizing or customizing for visitors affect their behavior and the exhibit design?

- A second class of things I think is interesting is how personalization and customization affect various aspects of the experience. For example, if you learn about basket weaving while I learn about paintings, we might share afterward or not. If we learn the same things, the experience is less personal but we might be more likely to talk about it. • Paul Aoki, Member of Research Staff, Xerox PARC

### Research on visitor privacy and personalization preferences

- What aspect of personalization or privacy do you find most valuable? We could arrange the information in different ways (e.g., based on color, the path they took, etc.). Which do they care about? Do we even need to know their name? • Craig Rosa, Director of Information Technology, The Tech Museum

### Brand extension

- Can this be of use to the museum in brand extension? • Rob Semper, Executive Associate Director, Exploratorium

### Gender issues

- A project that Hewlett-Packard did in Bristol showed that use of handheld computers had a positive impact on the way girls approach science. The contact name for the research project is Priscilla Heard. • Andrea Bandelli, Museum Consultant

### Walk-in versus repeat versus oriented visitors

- I'd be interested to find out the difference between a walk-in visitor with his or her own handheld and a visitor who received an orientation using special programs. And also walk-in versus repeat visitors. • Craig Rosa, Director of Information Technology, The Tech Museum of Innovation

### Scalability questions

- We need to get a better understanding of scalability issues, preferably before the giant roll-out. If you are planning a big show, like the great panda or the Mona Lisa, we know about that beforehand so we can manage the increase in visitors. But we need to do explicit scalability tests because we don't know what's going to jam. • Margaret Fleck, Senior Researcher, Hewlett-Packard Research Laboratories

