

Impact Planning, Evaluation & Audience Research

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Front-end Evaluation: *Places of Invention* Exhibition

Prepared for the
**Lemelson Center for the Study of Invention and Innovation,
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TABLE OF CONTENTS

SUMMARY AND DISCUSSION..... III

Introduction.....	iii
Findings and Considerations	iii
Recommendations	v
References	vi

INTRODUCTION I

Methodology.....	1
Analysis and Reporting Method.....	2

IN-DEPTH INTERVIEWS 3

Introduction.....	3
Response to “Places of Invention,” “Hot spots,” and Other Associated Terminology ...	3
Response to Silicon Valley.....	5
Response to Three Places of Invention.....	6
Personal Relevance in Exhibition Materials.....	12

APPENDICESSOME REMOVED FOR PROPRIETARY PURPOSES

SUMMARY AND DISCUSSION

INTRODUCTION

In preparation for the development of the NSF-funded exhibition *Places of Invention*, the Lemelson Center for the Study of Invention and Innovation at the Smithsonian Institution's National Museum of American History (NMAH) contracted Randi Korn & Associates, Inc. (RK&A) to conduct a front-end evaluation. RK&A conducted 50 in-depth interviews with walk-in visitors to the current Lemelson Center exhibition at NMAH, *Invention at Play*. The study explored potential barriers to the exhibition content for *Places of Invention*.

**Selected highlights of the study are included in this summary.
Please consult the body of the report for a detailed account of the findings.**

FINDINGS AND CONSIDERATIONS

The following discussion is structured around questions to inform the further development of the *Places of Invention* exhibition.

ARE THERE ANY CHALLENGES TO THE EXHIBITION CONTENT AND TERMINOLOGY?

Overall, visitors responded well to the preliminary ideas for the *Places of Invention* exhibition. The topic of the exhibition prompted some visitors to initially think about invention and places of invention in traditional ways (i.e., airplanes, the Wright Brothers, and Kitty Hawk) much like they did when presented with content for the front-end evaluation for *Invention at Play* (Pekarik & Dreibelbis, 2000); however, visitors are mostly amenable to thinking about invention in new ways. For instance, the majority of visitors were excited by and interested in each place of invention presented to them, and some explicitly commented that they liked thinking about invention in new ways and were surprised by some of the places shown to them. However, there were some naysayers who felt that the places shown to them were not places of invention because they did not agree with what the Lemelson Center had identified as inventions. For example, the Bronx received the greatest push-back from visitors, which we will discuss in more depth later. As such, the Lemelson Center should consider explicitly conveying its notion of invention so visitors are introduced to how the Lemelson Center broadly defines invention. One possibility is to define the concept “place of invention” early in the exhibition, and depending on the layout, reiterate the meaning of the concept throughout the exhibition to help visitors continually process and realize how the Lemelson Center thinks about invention.

Visitors' ideas about what a place of invention can be are not particularly problematic, although again, visitors tend to default to some traditional ideas about a place of invention, such as laboratories or Kitty Hawk, NC. However, these ideas about place are often predicated on how visitors think about invention. So again, setting visitors' expectations about invention early in the exhibition and reinforcing these new ways of thinking about invention throughout the exhibition space will help visitors to understand the many possible places of invention. One potential barrier though, is that interview findings reveal that the temporal nature of a place of invention is not top-of-mind for most interviewees. Potentially, it is because places described to visitors like Hollywood and the Silicon Valley are still recognized as places of invention. Furthermore, because “place” has so many meanings—

geographic location or region, building or physical location, appropriate moment—it is not so surprising that thoughts about time and temporality may not have been foremost in visitors’ minds without explicit prompting.

IS THE SILICON VALLEY A GOOD INTRODUCTION TO THE EXHIBITION?

Silicon Valley is vaguely familiar to most visitors. Visitors know just enough about the Silicon Valley to pique their interest, but not enough to make them skip over the content entirely. Regarding whether Silicon Valley is appropriate to present at the beginning of the exhibition, there are two potential barriers that the Lemelson Center should consider. First, visitors readily identify the Silicon Valley as a place of invention because it is where many technology-based companies are located. Because visitors already associate technology and physical products with invention, introducing the exhibition with the Silicon Valley may further solidify visitors’ ideas about invention as only being technology- or product-based. Secondly, the Silicon Valley is still considered an active place of invention, which on the surface does not convey the temporal nature of places of invention. These two reasons should not dissuade the Lemelson Center from using the Silicon Valley in the exhibition, but they should be considered as the team moves forward with the exhibition.

HOW DID VISITORS RESPOND TO THE THREE PLACES OF INVENTION?

Each of the places of invention received various feedback—all of the places were considered most appealing and least appealing by a portion of the population. This is encouraging because it means that there is something for everyone in the exhibition.

Hollywood seems to have the greatest appeal because it is most familiar to both children and adults. Additionally, visitors did not have trouble seeing how Hollywood is a place of invention. Some associated the film industry in general with cultural innovation, and others honed in on the technological inventions like the Technicolor camera. On the other hand, there were some visitors who responded negatively to the Hollywood story because they feel inundated with stories of Hollywood, but some of the visitors who initially had negative reactions to Hollywood warmed to the idea of focusing on the behind-the-scenes aspects of Hollywood—cameras and sound stages. Therefore, the Lemelson Center may consider how to quickly communicate that the Hollywood story told in the exhibition presents a unique perspective that visitors may not be expecting. For example, the Lemelson Center may highlight imagery depicting behind-the-scenes characteristics of Hollywood versus stardom.

The Bronx story was more polarizing than the Hollywood story. Some visitors were highly attracted to and excited about the Bronx story because it was unfamiliar and unexpected; for that reason, these visitors felt that the Bronx story was important for the NMAH to tell. At the other end of the spectrum were visitors who had adverse reactions to the Bronx as a place of invention, which were sometimes quite strong. For instance, one visitor called hip-hop “a bunch of people making noise.” These adverse reactions may be surprising because the Bronx story is similar to the Hollywood story in that it highlights an invention that some may consider artistic versus scientific. Possibly, the imagery shown to visitors regarding Hollywood, such as the Technicolor camera, better demonstrates the inventive nature of Hollywood, while the imagery regarding the Bronx did not; for instance, while the Bronx imagery included a photograph of men using DJ equipment, the equipment is not the focus of the image as the Technicolor camera is in the Hollywood story. Additionally, visitors may more easily associate Hollywood as a place of invention because the impact of Hollywood is highly visible today, while the influence of the Bronx is less overt. The Lemelson Center may need to emphasize the lasting impact of the Bronx in order to help visitors recognize the Bronx as a place of invention.

For visitors, Hartford was unquestionably a place of invention. Manufacturing and assembly lines seemed to align with their ideas about invention. Furthermore, the fact that many of the products

manufactured in Hartford are still used today resonated with visitors. For these reasons, however, some visitors perceived the Hartford story as familiar, which made some uninterested in this place of invention. Another potential barrier is bringing visitors to a fuller understanding that mass production and precision-tooling are the inventions of Hartford versus products like bicycles. Again, the Lemelson Center should carefully consider the imagery depicted for this story; additionally, an interactive may be highly effective at demonstrating the manufacturing procedure.

HOW DO VISITORS FIND PERSONAL RELEVANCE IN THE EXHIBITION CONTENT?

Some visitors found personal relevance in the exhibition by seeing either their place of residence, hometown, or industry represented in the exhibition content. Often times, personal connections occur at this basic level, such as a person feeling connected to the Wright Brothers and the invention of the airplane because he grew up in North Carolina. Therefore, the Lemelson Center's decision to include various locations and types of invention in the exhibition as well as plans to incorporate an interactive map that will allow visitors to view and/or add hot spots is on the right track. These plans allow greater opportunities for visitors to find personal relevance in the exhibition.

Yet, it is important for the Lemelson Center to realize that not all visitors will be able to find relevance in all the places of invention in the exhibition. For example, some felt that they could not see themselves in the Bronx story; they felt a cultural divide. Additionally, Hartford seemed most attractive to men or those who work in a manufacturing industry, and less attractive to women or those who do not work in manufacturing. As noted earlier, each of these three stories provides something for everyone. However, if the Lemelson Center wants to broaden the appeal of each place of invention, it may consider demonstrating how one place of invention affects the broader population in unexpected ways (for instance, hip-hop's influence on the music industry at large or the manufacturing industries' influence on how things are made today). Of course, the Lemelson Center should carefully consider how efforts to broaden the appeal of each story may dilute the thesis of the exhibition.

HOW DO THE CHARACTERISTICS OF PLACES OF INVENTION RESONATE WITH VISITORS?

One of the objectives of this study was to determine the extent to which the elements and characteristics of hot spots resonate with visitors. In this front-end evaluation, RK&A looked to see how these ideas organically emerged in response to the exhibition content. Encouragingly, visitors see how characteristics in places of invention, such as problem solving and creativity, connect to the places of invention. Furthermore, they see how these same characteristics are important to their personal and professional lives, particularly problem solving, communication, and creativity. Therefore, emphasizing the relationship between these skills and places of invention may serve as one way to help visitors feel like they are or can be part of a place of invention.

RECOMMENDATIONS

- ◆ Consider how to clearly express the Lemelson Center's definition of invention and places of invention to best set visitors' expectations regarding the exhibition. Also, consider how to present these messages throughout the exhibition to reinforce the Center's perspective.
- ◆ Be sure that the introductory area to the exhibition, or any area that defines "hot spot," uses clear language and imagery to depict hot spots, since visitors tend to think about hot spots as Wi-fi. Additionally, the Center may consider using the term "hotbed" instead, as it does in the *Places of Invention: First Lemelson Institute Report*.
- ◆ For the Bronx, consider how to show connections between the Bronx and contemporary society to help visitors see hip-hop's broad relevance. For instance, consider exploring the ways hip-

hop has infiltrated our culture at large or explore how different technologies created in the Bronx became staples of the music industry.

- ◆ For Hartford, consider how to clearly present the manufacturing process as invention. Potentially show imagery or create activities that focus on precision tools and how a product is made.
- ◆ Because Hollywood will conger up images of the rich and famous, consider highlighting and accentuating the technological advancements of film production to help visitors appreciate and learn about the behind-the-scenes angle of this story. Also, consider ways to leverage the appeal of Hollywood to expand visitors' understanding of places of invention to include creative innovation in addition to technological invention.
- ◆ RK&A and the Lemelson Center should review its goals related to visitors' understanding and practice of 21st Century skills so they can be explored more explicitly in the formative evaluation.

REFERENCES

Pekarik, A. & Dreibelbis, A. (2000). *Investigating invention: Results from the 1999 invention interview study*. Washington, DC: Office of Institutional Studies, Smithsonian Institution.

INTRODUCTION

The Lemelson Center for the Study of Invention and Innovation at the Smithsonian's National Museum of American History contracted Randi Korn & Associates, Inc. (RK&A) to conduct a front-end evaluation in preparation for *Places of Invention*—an exhibition funded by the National Science Foundation. The evaluation tested preliminary ideas for the exhibition.

Specifically, the evaluation explores:

- ◆ Visitors' understandings of and associations with the concept of a hot spot, both generally and specifically (for example, ideas of Silicon Valley as a hot spot);
- ◆ Visitors' reactions to the three hot spots explored in the exhibition (Hartford, Hollywood, and the Bronx), particularly the extent to which visitors recognize the elements and characteristics that supported these communities in becoming hot spots (flexibility, communication, collaboration, etc.);
- ◆ In what ways do the three stories and the concept of a hot spot have personal resonance for visitors (i.e., for their own lives and their communities); and
- ◆ The extent to which visitors associate the elements and characteristics of hot spots (flexibility, communication, collaboration, etc.) with 21st Century skills that they experience in their lives.

METHODOLOGY

RESEARCH DESIGN

Front-end evaluation tests ideas and strategies during the initial planning stages of a project. For this project, RK&A used in-depth interviews as part of the front-end evaluation to explore how walk-in visitors experience exhibition content for *Places of Invention*. In-depth interviews produce data rich in information, as they encourage and motivate visitors to describe their experiences, express their opinions and feelings, and share the meaning they construct from exhibition material.

The evaluator and a trained data collector conducted 50 in-depth interviews at NMAH in July 2011. The evaluator and data collector positioned themselves near seating available in the exhibition *Invention at Play* and intercepted adult visitors (18 years or older) nearby. If the visitor agreed to be interviewed, the evaluator conducted the interview with the visitors and any other visitors in their group (children included) (see the interview guide in Appendix A). The interviews asked visitors to comment on various exhibition materials, including written materials regarding three places of invention (the Bronx, Hartford, and Hollywood) and a list of words that the Lemelson Center associates with places of invention (see Appendix B). Visitors were instructed to read as much of the information as they normally would, although most visitors read everything. All interviews were audio recorded with visitors' consent and transcribed to facilitate analysis.

HUMAN SUBJECT PROTECTION

As required by the Smithsonian Institution, RK&A secured approval from the Smithsonian Institution's Internal Review Board to conduct research with human subjects. Verbal consent was secured from all participants in the study. All data generated from the study are anonymous; names, email addresses, street addresses, phone numbers, or other identifiable information were not collected. Further, the

project team, including data collectors, completed human subject training offered by the National Institutes of Health (available at <http://phrp.nihtraining.com/users/login.php>) or completed an equivalent program. Certificates of completion are on file. Additionally, data collector training provided by RK&A covered issues of visitor sensitivity.

ANALYSIS & REPORTING METHOD

The data are qualitative, meaning that results are descriptive. In analyzing the data, the evaluator studies the transcripts for patterns and, as patterns and trends emerge, groups similar responses. The objectives of the study as well as our professional experience with art museum visitors informed the analysis.

Data are reported by objective (versus following the framework of the interview guide). Within sections, trends are presented from most- to least-frequently occurring. Additionally, data from audio-recorded interviews are reported in narrative and with exemplary quotations. In quotations, the interviewers' questions or comments are presented in parentheses. If a quotation includes comments from more than one interviewee, the first speaker is identified by one asterisk (*), the second speaker by two asterisks (**), the third speaker by three asterisks (***), and so on. The genders and ages of interviewees are identified in brackets following the quotations.

IN-DEPTH INTERVIEWS

INTRODUCTION

Randi Korn & Associates, Inc. (RK&A) conducted 50 interviews with walk-in visitors to the National Museum of American History (NMAH). Interviewees were recruited in the exhibition *Invention at Play*, and 81 percent of intercepted visitors participated in the interviews, which were audio recorded to facilitate analysis. Slightly more than one-half of interviewees are female, and the other one-half are male. Most interviewees were visiting in groups with at least one child and two adults. The median age of interviewed adults is 43, and the median age of interviewed children is 12. Almost two-thirds of interviewees were visiting the NMAH for the first time.

RESPONSE TO “PLACES OF INVENTION,” “HOTSPOTS,” AND OTHER ASSOCIATED TERMINOLOGY

“Places of invention” and “hot spots” are two terms that the Lemelson Center plans to use in the exhibition. RK&A asked interviewees several questions about these terms to identify any misconceptions or barriers to understanding. Also, at a point later in the interview process, RK&A showed interviewees a list of terms that the Lemelson Center associates with places of invention and asked interviewees to identify any terms that they think are confusing or do not describe places of invention.

THOUGHTS ABOUT THE TERM “PLACE OF INVENTION”

Nearly two-thirds of interviewees talked about invention in a purely scientific or technological context. For instance, nearly one-half referred to a specific invention, such as the light bulb, telephone, or airplane (see the first quotation below). Most often these interviewees referred to older or historical inventions, while a few mentioned contemporary inventions like cell phones and iPads. Additionally, about one-quarter identified specific historic inventors, such as Thomas Edison, the Wright Brothers, Albert Einstein, Alexander Graham Bell, and Leonardo da Vinci. By contrast, about one-third of interviewees had broader views about invention. For instance, several said that invention is “anything that makes our life easier and better” or “changes our way of life.”

(When I say ‘invention,’ what comes to mind for you?) Just about anything from the light bulb, to the telegraph, to the automobile, to all the textiles and fabrics, lasers, just on and on and on. They’re all inventions! [male 66]

When prompted to think specifically about a “place” of invention, interviewees provided various associations. For instance, about one-third of interviewees thought about place at the micro-level, naming labs and universities, like Bell Labs and MIT (see the first quotation below), while several interviewees thought about place at the macro-level, naming cities or areas, like Kitty Hawk, the Silicon Valley, and Detroit (see the second quotation). Further, several interviewees expressed a broad view of what a place of invention can be often because their ideas of invention were similarly broad; for instance one interviewee said that kitchens, garages, and backyards can be places of invention because everyone invents things (see the third quotation).

(When I say ‘places of invention,’ what comes to mind for you?) I think of universities; I guess that’s the main thing. Scientific labs. [female of unreported age]

Detroit—the automobile. Obviously, Silicon Valley—computers. Back to the Vikings for ships, or England during the time of all the great fleets. Eskimos and dogsleds. [female 44, male 50]

(When you hear ‘places of invention,’ what comes to mind for you?) A laboratory, a garage, the outdoors—any place you’re trying to fix something or create something. (And so, when I say ‘invention,’ what comes to mind for you?) Well at first, stuff like scientists, Edison and that kind of thing. But everybody invents stuff in their own way—even if it’s something like a better way to get out of the house in the morning. [female 54]

THOUGHTS ABOUT THE TERM “HOT SPOT”

More than one-half of interviewees were either unsure what the word ‘hot spot’ has to do with places of invention, or had associations to the word that are contrary to the Lemelson’s intention. For instance, several said the term prompted them to think about Wi-Fi hotspots and Internet connectivity, while a few others said the term prompted them to think about atomic bombs, the sun, trouble and controversy, volcanoes, or places where paranormal activity happens (see the quotation below).

(And in this exhibition, they may use the word ‘hot spot’ as a way to refer to a place of invention. Do you see any connections between those two words?) *I don’t know. It makes you think of red, like a hotspot, or the Sun too. I don’t know if there are hotspots on the Sun or not. **No, because when I think of hotspot, I think of Wi-Fi—a hotspot for finding Internet connections. [female 38, male 42]

By comparison, almost one-half made associations with the term hot spot that were in keeping with the Lemelson’s intentions. Several said that a hot spot is a location where invention happened, and a couple also thought it may be a time in history when a lot of invention happened (see the first quotation below). Additionally, a few said that a hot spot is a place where inventors, thinkers, or an industry congregates. For example, one person described a hot spot as a “magnet for a certain industry,” while another described a hot spot as a concentration of companies or scientists from a certain field (see the second quotation).

To me [hot spot] would mean that there might be times in history, or even locations, places, where a lot of ideas and inventions take place at the same time. . . . It might be a university. It might be the Renaissance. Or, it might be 18th Century London. [female 68]

I think hot spots would be somewhere like Silicon Valley—more geographical places where there’s a concentration of both companies and scientists working in a particular field. [male 66]

CHARACTERISTICS OF PLACES OF INVENTION

The Lemelson Center identified several terms that describe or may be associated with places of invention. Twelve of these terms, listed in alphabetical order, were shown to interviewees: adaptability, collaboration, communication, creativity, flexibility (of mind and of space), innovation, initiative, interdisciplinary thinking, leadership, networking, problem-solving, and self-direction. For the most part, interviewees said that all of the terms are clear and describe places of invention as they understand them and provided examples of how they see the characteristics in the three places of invention, which is described later. Nevertheless, a few interviewees each struggled with the association between some of the terms and places of invention, as presented below.

Several interviewees did not think that leadership relates to places of invention; for instance, one interviewee said that innovative people do not need leadership, while another said that you do not need

leadership if you are working alone (see the first quotation below). A few others did not think that self-direction describes places of invention. These interviewees interpreted self-direction as working alone versus in teams, which contradicts their idea that invention results from a team or the sharing of ideas among individuals (see the second quotation below). A few did not understand what networking means or what it has to do with places of invention; for instance, a couple said that inventors do not need to network because they have good ideas, and another said that networking is a self-serving behavior that she/he does not associate with invention. A few did not know what interdisciplinary thinking means and/or did not think the word sounded like something that would be associated with places of invention. One interviewee, for example, said the term sounds “too in the box,” and another said the term sounds “harsh.”

(Are there any characteristics here that you do not feel apply to places of invention?) They all fall under it a little bit, but leadership, it depends on if you’re working with others. So, I mean, that’s kind of the grayish area. If you’re just working on your own, you don’t really need leadership. You just need self-direction. [male 16, female 34]

Self-direction. I don’t know that you have to be self-directed because I think a lot of people’s invention actually bounce ideas off of people and work with others. I don’t see it as an individual sport. [female 47]

Several interviewees commented on the similarity between the terms shown. For instance, a few said that adaptability and flexibility mean the same thing, while a few others said that creativity and innovation mean the same thing. Additionally, a couple were unsure of the difference between initiative and self-direction, and one said that networking and collaboration are similar.

I’d say adaptability and flexibility are kind of the same thing, and collaboration and networking kind of go together. [female 54]

Noteworthy, when asked about how these characteristics fit with ideas about places of invention, many used the terms to describe people versus the places themselves. In particular, flexibility and adaptability were often used to describe how people responded to places or situations as opposed to how a place is flexible. This idea is corroborated by how interviewees’ use the terms to describe the three places of invention, described later in the report.

RESPONSE TO SILICON VALLEY

The Silicon Valley is one place of invention that the Museum has considered using to introduce the exhibition. As such, RK&A asked interviewees several questions to gauge their familiarity with and understanding of the significance of Silicon Valley as a place of invention.

Most interviewees associated the Silicon Valley with the American technology sector. The majority demonstrated a superficial familiarity with the Silicon Valley, describing computer technology and electronics, with a few mentioning specific companies or products, like Google, Cisco, and Apple’s iPod (see the first quotation below). By comparison, one-quarter demonstrated a more in-depth understanding of the Silicon Valley, relating it back to the use of silicon in computer chips, transistors, and semiconductors, although some of these interviewees spoke with a little uncertainty (see the second quotation). A few interviewees were not familiar with the Silicon Valley.

(One of the places the exhibition might explore is the Silicon Valley. So, when I say the Silicon Valley, what comes to mind?) The Internet—Internet companies. I don't know if Google is there, but that's what comes to mind. [female of unreported age]

It started up with major companies starting to go there because of, I believe especially computer companies because—I don't know if it was the invention of silicon that was there or if they found silicon there or whatever—but it inspired a lot of these Internet and computer companies to go there. I think Apple, and I can't remember all of them [female 43, male 46]

Interviewees familiar with the Silicon Valley were asked why they thought the Silicon Valley became a place of invention. Most said that the technology industry concentrated there, with some indicating that it was because of specific companies and people, like Apple and Steve Jobs as well as Microsoft and Bill Gates, established themselves in the area (see the first quotation below). Some of these interviewees emphasized the importance of sharing or feeding off of each others' ideas (see the second quotation). Additionally, a few thought the Silicon Valley became a place of invention because of the universities in the area, and a few others thought it may be because of the business climate, such as availability of tax breaks or other monetary incentives.

(One place of invention that we might explore is the Silicon Valley. So, when I say the Silicon Valley, what comes to mind for you?) Microchips. (And why or how do you think that the Silicon Valley became a place of invention?) The people out there—Steve Jobs and everyone behind Microsoft. [male 42]

(And why or how do you think this particular place became a place of invention?) . . . There was just a bunch of computer organizations that happened to kind of be in that area. Then, they fed off of each other's ideas. . . . It was a fertile ground for there to be new ideas and new innovations. [male 21, female 22]

RESPONSE TO THREE PLACES OF INVENTION

Three other places of invention that the Museum intends to explore are the Bronx, Hartford, and Hollywood. RK&A showed visitors materials regarding each place, which included a brief description indicating why it is a place of invention, as well as three images of objects or photographs related to each place of invention (see Appendix B). RK&A instructed interviewees to read as much or as little as they liked and asked them a series of questions to explore what meaning interviewees make from the three places of invention. Additionally, we have reported how visitors associated the list of characteristics that the Lemelson Center associates with places of invention to each of the stories.¹

BRONX

THOUGHTS ABOUT THE BRONX AS A PLACE OF INVENTION

After looking at the text and pictures, many said the Bronx is a place of invention because hip-hop was created there, including DJing and breakdancing. The majority talked about hip-hop as a form of entertainment, with some describing kids having fun and expressing themselves (see the first quotation below); these interviewees were likely influenced by the images presented to them more so than by the text. Several others described hip-hop beyond pure entertainment and described it as a cultural movement that brought the community together (see the second quotation). Additionally, a couple interviewees made reference to the technological inventiveness in the Bronx. By comparison, several

¹ RK&A asked interviewees about the characteristics near the end of the interview, but we have reported the findings here to provide a clearer understanding of how visitors think about the three places of invention presented to them.

interviewees did not believe that the Bronx is a place of invention; for instance one interviewee simply thought of hip-hop as a creation but not an invention (see the third quotation), while another responded more dismissively, describing hip-hop as “a bunch of people making noise.”

(And since you’ve read about these stories, how do you think these particular places became places of invention?) Well, for hip-hop, it seemed like something fun to do, I guess. And it inspired present day songs. [male 20]

I mean, I hadn’t thought about cultural inventions. . . . I guess, I’m looking at this in a new way, that music and cultural movements can be as much of an invention as technology. . . . in the Bronx, people really didn’t move there; they couldn’t move elsewhere. And, they just kind of used their sense of community to develop their music and their cultural style. [female 41]

I don’t know if hip-hop is an invention or a style. I don’t know if a style is an invention. I’m thinking more, something more practical, well not practical, but mechanical or solid. I think there’s ideas and unless you call that an invention, I’m missing the word. These, like a rifle [in the Harford story], those are actual inventions. [female of unreported age]

Of those interviewees who agreed the Bronx is a place of invention, the majority said it became a place of invention because of the adversity that people in the Bronx faced, such as urban blight; these ideas came directly from the text presented to interviewees (see the first quotation below). While some very explicitly attributed the Bronx’s emergence as a place of invention to adversity, some did so implicitly. For instance, one interviewee said the Bronx has to be a place of invention because people have found a way to survive there.

(From these brief descriptions that we read, why do you think that these places became places of inventions? Let’s start with the Bronx.) Well, it says because of the Cross Bronx Expressway. It sort of caused a downturn in the neighborhood, and I guess they’re saying that hip-hop and graffiti was a way for people to take back their neighborhood. [male 38]

When shown the list of words that the Lemelson Center associates with places of invention², interviewees readily associated creativity with the Bronx story, with nearly one-third of interviewees describing how the Bronx depicts creativity. The majority of these interviewees described how the people in the Bronx created new sound, dance moves, or outlet for expression (see the quotation below). Problem-solving and adaptability were also mentioned often, and these interviewees related it back to the adversity that people faced in the Bronx.

(Perhaps, pick one word each that you feel best reflected the stories that you looked at) Creativity. (And how would you relate that back to the stories?) In the Bronx, they created a new sound and a new form of expression with the street dancing. [female 44, male 50]

MOST APPEALING ASPECTS OF THE BRONX STORY

Almost one-third said that the Bronx is the most appealing story of the three. The majority of these interviewees said they liked the story because it was unexpected and surprising; for instance, one interviewee said that it broadened her thoughts about invention since she had never thought about hip-hop as invention (see the first quotation below). Additionally, a few others found the Bronx story inspiring because people were fighting against adversity and a phenomenon emerged (see the second quotation).

² The twelve characteristics are: adaptability, collaboration, communication, creativity, flexibility (of mind and of space), innovation, initiative, interdisciplinary thinking, leadership, networking, problem-solving, and self-direction.

(Which of these three places appeal to you the most?) I didn't think of hip-hop as being an invention, but I like that it is a way to look differently [at invention as more] than just machines and physical things. I would say that was my preference because it broadens the idea of invention. I prefer thinking in a broader perspective. [female 47]

*The one that surprised me the most was the Bronx because it is usually not known for technology. . . . **The Bronx was known as almost being a war zone. . . . *It does interest me how this became basically what it says here—eventually it became a global phenomenon out of a part of a district of a City where, as she described, is a bad area. [male 15, female 51]

LEAST APPEALING ASPECTS OF THE BRONX STORY

Almost one-half said that the Bronx is the least appealing story of the three. The majority of these interviewees were not convinced that that the Bronx is a place of invention, or at least, not as inventive as Hartford or Hollywood. Some said that, even though hip-hop was creative or innovative as well as culturally significant, they do not see it as an invention because it is not technology- or product-based (see the first quotation below); this may partially be explained by the materials presented to interviewees (the pictures selected to go with the Bronx story focused less explicitly on technological advances than those pictures selected for Hartford and Hollywood).³ A few of these interviewees had strong negative reactions; for instance, one person called hip-hop a “glorified fad” (see the second quotation). Furthermore, some interviewees alluded to the narrow appeal of the Bronx story, with a few saying that they did not like hip-hop, and a few said they were unable to relate or connect to the Bronx story.

(Which of these places does not appeal to you as much?) The hip-hop was kind of interesting, but I never really considered hip-hop as a source of something that people wanted to enhance and build on. But again, it's not really the manufacturing or invention type of thing. [male 66]

When you look at the Bronx and all that stuff, [which] I grew up with it, but to me, that was a glorified fad. I mean, if you're doing a section on fads, one-day-wonder kind of thing, it'd be okay. But when you look at Hollywood and the continual impact that that has, and you look at Hartford and the stuff that came out of there, that was world changing. It wasn't, 'Oh, this is neat for like the 80s.' [male 38, female 66]

HARTFORD

THOUGHTS ABOUT HARTFORD AS A PLACE OF INVENTION

In contrast to the Bronx, most visitors readily understood why Hartford is known as a place of invention. The majority described the development of manufacturing and mass production (see the first quotation below). By comparison, several described specific products like sewing machines, suggesting that they considered the products invention versus the manufacturing process (see the second quotation). Additionally, several were surprised by the amount of items manufactured in Hartford, and particularly, those items that we still use today, like the bicycle.

³ The images shown regarding the Hartford and the Hollywood very explicitly show the technological innovation of the places. While part of the Bronx includes technological innovation, such as “experiment[ing] with new ways of playing and handling records, amplifying sound, mixing and cueing music, and using the turntable as an instrument when sophisticated DJ equipment did not yet exist,” the imagery did not make this as transparent. Additionally, the text for the Bronx was a bit longer than those for Hartford and Hollywood, and thus, some interviewees may not have read far enough into the text to take away ideas about technological innovation.

(How are each of these a place of invention?) Obviously this one [Hartford] is really [a place of invention]. This one really because the technological knowledge and skills and the precision tool-based industries. [female 65]

You have something like Hartford for the everyday types of products, like guns, bicycles, sewing machines. [male 61]

There are just so many things that were invented back then [in Hartford] that are still being used today. Some things are invented, and then they just become obsolete. These [things invented in Hartford] are just fine-tuned for today's world, but we still use everything. [female 62, female 64]

The majority of interviewees could not explain how or why Hartford became a place of invention. But, one-quarter said that Hartford became a place of invention because of the people there. Interestingly, in talking about people, these interviewees did not mention individual inventors or companies (e.g., Colt Armory), but rather, talked about the population generally; for instance, one interviewee commented on the labor pool required to fill the manufacturing jobs, which may have been prompted by the image of men assembling Columbia Ordinaries (see the quotation below).

Well, it looks like Hartford had some type of a labor pool and manufacturing developed there took advantage of that. [female 41]

When shown the list of terms that the Lemelson Center associates with places of invention⁴, interviewees most readily associated problem solving with Hartford because interviewees said the story showed how people sought to figure out better ways to make things like sewing machines via assembly lines (see the quotation below).

Problem solving would be Hartford and the mass production. (How would you say that they used problem solving?) They said, 'This is hard to get everything done. We have to have an easier way to make it happen.' And they figured out a way to make an assembly line, basically, to do mass production. [female 47]

MOST APPEALING ASPECTS OF THE HARTFORD STORY

Almost one-third said that Hartford is the most appealing story of the three. The majority of these interviewees said they are interested in manufacturing or the types of invention created in Hartford, such as bicycles, typewriters, and sewing machines. More specifically, a few were interested in the great historical impact of Hartford, such as the number of inventions and processes developed (see the first quotation below), while others described their personal connections to the industry, such as working in the manufacturing industry or living in or near Hartford (see the second quotation).

(So, of these three places, which one appeals to you the most?) I would probably say Hartford, Connecticut. (Can I ask how or why?) Hartford, back in the 19th Century, had manufacturing factories that did different kinds of things—sewing machines, armaments, rifles, and pistols. And I think just the fact that there were a lot of varying manufacturing processes there, they would tend to feed on one another. What was pretty, what was a good method to do something in the sewing machine might also work very well in some other machine that, perhaps, made gun parts. So, I think just the fact that there was so much manufacturing going on there, it would tend to enhance the inventions of the new methods and new machines. [male 66]

⁴ The twelve characteristics are: adaptability, collaboration, communication, creativity, flexibility (of mind and of space), innovation, initiative, interdisciplinary thinking, leadership, networking, problem-solving, and self-direction.

(Of those three, which one was most appealing to you?) Hartford. (And why would you say that?) I'm an engineer. I have a long history of manufacturing background and it just kind of jumped at me. [male 40]

LEAST APPEALING ASPECTS OF THE HARTFORD STORY

Almost one-half said Hartford is the least appealing story of the three. The majority of these interviewees simply were not interested in the topic of manufacturing and products like guns and sewing machines (see the first quotation below). Additionally, and in direct contrast to other interviewees, a few said the Hartford is familiar, expected, or they perceive that it has been explored enough elsewhere (see the second quotation).

(Do any of them not appeal to you as much as the other ones?) *I would say the Bronx and Hollywood appeal to me more than Hartford. **Same for me. . . Armory and guns, it's just not my thing. [female 30, female 31]

(So, which one appeals to you the least?) Probably, Hartford just because it seems like a lot of this, you know, the 19th Century, we've really seen a lot on that already. [female 10, female 42]

HOLLYWOOD

THOUGHTS ABOUT HOLLYWOOD AS A PLACE OF INVENTION

After looking at the text and pictures, most interviewees agreed that Hollywood is a place of invention because it is where the film industry is located. The majority said that it is a place of invention because the industry had to come up with new ideas to entertain people (see the first quotation below), with several simply describing the industry as creative and with several others identifying the development of film-making technology like the Technicolor camera and sound stages (see the second quotation). Additionally, a few described Hollywood as being culturally significant, and thus, a place of invention; for instance, one interviewee described how Hollywood has changed our way of life. By contrast, a couple said that films are not inventions.

(Do you have any thoughts of why the other two may be a place of invention?) Hollywood, everything has to be bigger and better as it goes on, meaning they have to come up with new ways to entertain. . . . I think people have to kind of just throw out ideas and see if it works. [male 16, female 34]

(And we haven't talked about Hollywood. Do you see Hollywood as a place of invention, then?) Oh, absolutely! The motion picture industry involves so much more than just actors and actresses in front of the camera—just the evolution of the cameras from silent pictures to sound pictures, to Technicolor, to the digital cameras that are used today. [male 66]

The majority of interviewees matter-of-factly said that Hollywood is a place of invention because the film industry is there (see the first quotation below). Several others explained that Hollywood became a place of invention because of the cheap land, varied scenery, and ideal climate in the area, as described in the text (see the second quotation). A few others said that Hollywood became a place of invention because of the people in the area; for example, one interviewee said that some immigrants planned to start a new life in California, while another interviewee described the diverse population in the area.

(Why do you think these three places became places of invention?) Just, I guess what's going on there. Like, obviously Hollywood, it makes sense that a lot of movie things are going on there. So, it is what is going on in that area that fits the needs of the people there. [female 41]

(And why do you think these particular places became places of invention?) Hollywood, because of the sunlight. It says so. And there was a movement West, and there was more space. And back then, there weren't so many people living out West, and so it was cheap land for them. [female 47]

When shown the list of terms that the Lemelson Center associates with places of invention⁵, interviewees most readily associated creativity and innovation with Hollywood, often using creativity to refer to the development of film ideas but also the evolution of film technology (see the quotation below).

For the Hollywood one, I would say innovation. (How would you say that they were using innovation?) Well, the evolution of how movies were filmed then and now. [There was] a lot of innovation with how cameras are made now and what they can do now, versus all the computer technology that is important to making pictures nowadays. They didn't have that back then. So, that's a lot of evolution. [female 48]

MOST APPEALING ASPECTS OF THE HOLLYWOOD STORY

More than one-half said that Hollywood is the most appealing story of the three. Several were interested and amazed by the development of film technology; some commented on the advancement of technology from the Technicolor camera to the digital technology used today (see the first quotation below). Several others liked that Hollywood was familiar and popular because they felt it would be appealing to a large audience (see the second quotation).

(Out of these three places, is there one that appeals to you the most?) Probably the movie set. The Wizard of Oz. (And why is that?) Just because the cameras have changed, and the technology has changed so much. The Wizard of Oz came out in what? 1930 or something? So, it's changed quite a bit as far as how we make movies now. [female 39, male 45]

(Which of these three places of invention appeal to you the most?) Probably Hollywood. (Why is that?) I think that it appeals to a broader, a bigger amount of people and they'll relate to it a lot more than the others. I think the other ones, I think the Hartford's probably more important, but Hollywood's probably going to draw more people to the exhibit. [male 42]

LEAST APPEALING ASPECTS OF THE HOLLYWOOD STORY

A few interviewees said that Hollywood is the least appealing story of three. These interviewees said that you hear about Hollywood too much. For instance, one interviewee said there are other things in the Museum related to Hollywood (see the first quotation), while another interviewee more adamantly opposed the royal-ization of Hollywood in general (see the second quotation). A couple liked it least because they did not feel like films are inventions; however, one interviewee who initially named Hollywood as least appealing said that, upon closer examination and realization that the Museum plans to focus on the behind-the-scenes aspects of Hollywood, she would be interested (see the third quotation).

(And is there one that doesn't appeal to you as much?) Hollywood. I don't care about movies. You guys have a whole bunch of that stuff upstairs. [female 26]

(And is there a place that doesn't appeal to you as much?) Well, just personally, Hollywood doesn't at all. (And why is that?) Well, I think good writers are there and all, but I think over

⁵ The twelve characteristics are: adaptability, collaboration, communication, creativity, flexibility (of mind and of space), innovation, initiative, interdisciplinary thinking, leadership, networking, problem-solving, and self-direction.

the years, I think we've tried to make Hollywood quote/unquote our royalty, and . . . do we need a royalty? It seems obsessive. [female 62]

I didn't read that [the Hollywood story] as thoroughly as I should have. Behind the scenes would be a heck of a lot more interesting because I have no idea how that part of it [works]. I don't want to see any more about movie stars, but behind the scenes [is interesting]. [female 55]

PERSONAL RELEVANCE IN EXHIBITION MATERIALS

RK&A asked interviewees several questions to explore how the concept of places of invention resonates.

SEEING THEMSELVES AS PART OF A PLACE OF INVENTION

After some questions about places of invention and hot spots, RK&A asked interviewees whether they could see themselves as part of a place of invention. Most interviewees responded affirmatively; one-third described how they are part of or studying to be part of an inventive industry, like the wireless industry, medical field, agriculture, and physics (see the first quotation below). Another one-third said that the place that they live in or grew up in makes them feel like part of a place of invention; for instance, one interviewee said she was from North Carolina so feels connected to the Wright Brothers, while another said she is from Indiana, which is known for race car innovation, farming, and factories (see the second quotation).

(And then, do you guys see yourselves as being part of a place of invention?) *Yeah. **Yeah. (How?) *We're both Physics majors, so we're big science people. **Yeah. I'm currently working with the Committee on Science, Space, and Technology. That's definitely the stuff I want to get into. [male 21, female 22]

We're from Indiana. And when you think of Indiana, you think of race cars. The invention of aerodynamics and everything that goes into racing, whether it's the open wheel or whether it's NASCAR. Or even the idea of farming, and the factory, and the differences from what they used to use, you know, plowing the fields now to what they do now. [female 38]

CHARACTERISTICS OF PLACES OF INVENTION THAT RESONATE WITH THEM

When shown the list of characteristics that the Lemelson Center associates with places of invention and asked to identify characteristics that resonate with their personal and professional life, nearly one-half of interviewees said they experience problem solving, mostly describing their professional life (see the first quotation below). Nearly one-third of interviewees said communication, describing it as important to all areas of their lives, and another one-third mentioned creativity, often saying that they enjoy singing, drawing, or doing arts and crafts (see the second quotation).

As far as my work, I would say problem solving. I'm a nurse. When a patient's crashing, I've got to know what to do. I have to use my brain and think, 'What's causing this? Why are they all of a sudden in heart failure or why aren't they breathing? Why can't they do this?' [female 26]

I would say creativity because I draw and play guitar and more like artistic things. . . . I write a lot of short stories. [female 14, female 61]

Initiative and innovation were mentioned by just a few interviewees as well as networking, self-direction, and interdisciplinary thinking. However, it is not so surprising that these were mentioned infrequently because some of these terms were unclear to interviewees or similar to other terms listed.

APPENDICES

APPENDIX A: INTERVIEW GUIDE

REMOVED FOR PROPRIETARY PURPOSES

APPENDIX B: INTERVIEW MATERIALS

BRONX MATERIALS

The Bronx

Hip-hop began humbly in the 1970s as a creative outlet for Bronx youth living in challenging surroundings. The Cross-Bronx Expressway, completed in the 1960s, displaced thousands of businesses and residents and gave way to urban blight. Bronx residents and leaders resolved to take back their neighborhoods, fostering the growth of hip-hop's key elements—breakdancing, graffiti writing, DJ-ing, and MC-ing. Hip-hop parties took place in school gyms, community centers, and parks. DJs experimented with new ways of playing records, amplifying sound, mixing music, and using the turntable as an instrument before sophisticated DJ equipment existed. The hip-hop movement fueled innovation, community, and creative risk-taking in the Bronx and eventually became a global phenomenon.



1 Boy breakdancing in the street



2 G Man and his crew Djing at a park in the Bronx in 1984 photo by Henry Chalfant



3 Map of the Bronx

HOLLYWOOD MATERIALS

Hollywood

By the late 1920s, most of the American film industry had moved to Hollywood from the East Coast, attracted by cheap land, varied scenery, mild climate, and reliable sunlight. During the 1930s and '40s, Hollywood entered its "Golden Age," fueled, in part, by new filmmaking technologies--especially sound-on-film and color--and the things that went with those inventions (cameras, camera dollies, film, microphones, sound stages, make-up, costume design, lighting, etc.). Inventors were an important part of the community that produced some of the most enduring films yet, like "The Wizard of Oz" and "Gone with the Wind," and eventually became a global phenomenon.



1 Depiction of crew on a film set

2 Filming of the Wizard of Oz

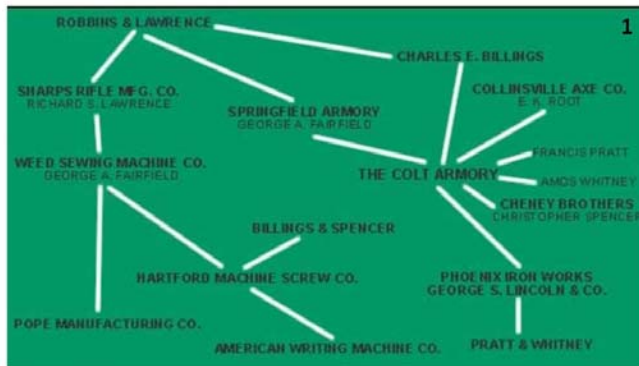
3 Technicolor camera



HARTFORD MATERIALS

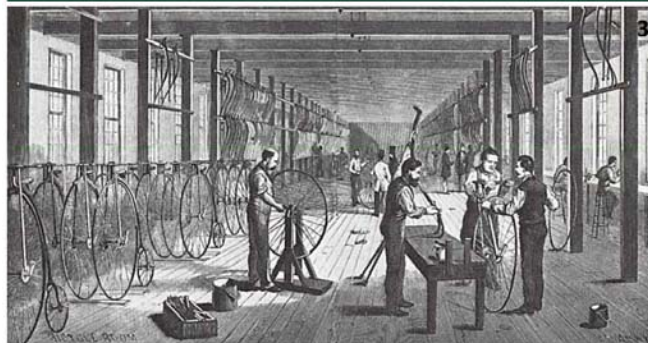
Hartford

As a 19th-century nexus of gun, sewing machine, bicycle, typewriter, and even automobile manufacture, Hartford, Connecticut shows the lineage of American mass production. Hartford's evolution as an industrial center and training ground for gifted engineers reveals a fluid network of inventive people with high job mobility sharing technological knowledge and skills across precision tool-based industries. The life cycles of the city's factories that incubated those skills, such as the Colt Armory, Weed Sewing Machine Company, and the Pope bicycle manufacturing company, exemplify the movement of people, skills, and technology that fueled invention and made Hartford a hot spot as mass production took hold in America.



1 from Ellsworth Grant, "The Miracle on Capital Avenue," *Hog River Journal*, Summer 2004

2 Stand of Identical Muskets, Springfield Armory NHS



3 Assembling Columbia Ordinaries, Weed factory, *Scientific American*, 1880

TERMS THE LEMELSON CENTER ASSOCIATES WITH PLACES OF INVENTION

Adaptability
Collaboration
Communication
Creativity
Flexibility (of mind and of space)
Innovation
Initiative
Interdisciplinary thinking
Leadership
Networking
Problem-solving
Self-direction