VISITOR DRIVEN EXHIBITIONS

CURATING MUSEUMS BASED ON VISITOR BEHAVIOR PATTERNS

BRADY LAURIN

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OBSERVATION.

INTERPRETATION.

SIMULATION.

Methodology

The methods chosen to execute this study were selected to be as easily accessible as possible. The lack of additional funding beyond personal investment by the researchers into this study was a driving factor in the methodology, though additional substitutes may be described within this section. The ability to replicate and apply this research was also an important factor in the methodology. When possible, low-cost, free, or open-source technologies were chosen to enable this research to be easily replicated and applied to various environments beyond educational museums.

Recorded data was collected through the use of the Brinno TLC200 Pro Time-Lapse Camera. The camera was positioned to view wide swaths of the exhibit space and programmed to record 1 still image every second. The recordings were then processed using MatLab to generate overlays illustrating areas with a large amount of movement, and visitor paths were tracked using Kinovea tracking software. Both softwares used were freely available to download as a student researcher.

Visitor tracks and the raw video files were studied to determine any potential behavior patterns among patrons of the museum. These included statistical tracking of the engagement rate among visitors for specific pieces or clusters in the exhibit space. This information was then further studied to reveal and deeper similarities not noticed through the initial observation.

Test simulations of the museum exhibits were created in AnyLogic, an agent based simulation program. The statistical information collected during analysis was applied to form the probability definition and the simulation was run for comparison.

Exhibit Zone A

Analysis of visitor paths in exhibit zone A point to a number of patterns in the way people view the display, particularly in the order and direction that they follow. The primary, and overwhelmingly standard path of travel through the exhibit flows through the exhibit in a linear fashion without any doubling back or looping around. The path is very densely defined through the majority of the exhibit, before splitting around a protected artifact case in the open floor area at the end of the exhibit. Prior to the fork and seen in one of the directions after, the path is very uniform among visitors, following the walls of the space. More erratic behavior and apparent indecision is visible in the open floor area of the zone.

The recognition of this phenomenon can be of great aid in planning exhibit spaces. If the goal of the exhibit relies on clear progression of information and an implied order of experiencing the information, the path analysis from zone A points towards the use of a more confined space with walls arranged to pass visitors from piece to piece. In exhibits where the experiences are not reliant on a set viewing order or the goal is free exploration, zone A analysis seems to suggest that open spaces can foster that type of behavior.
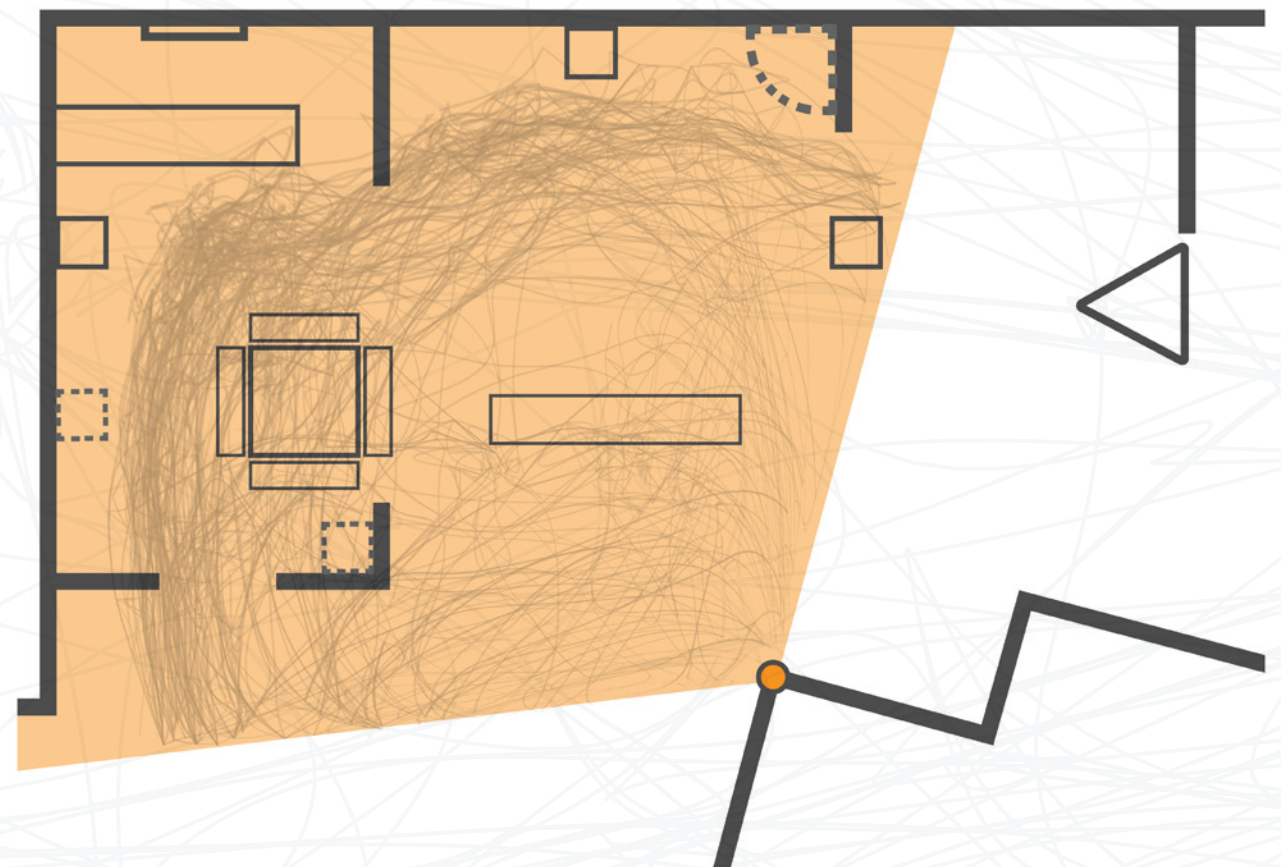
Analysis
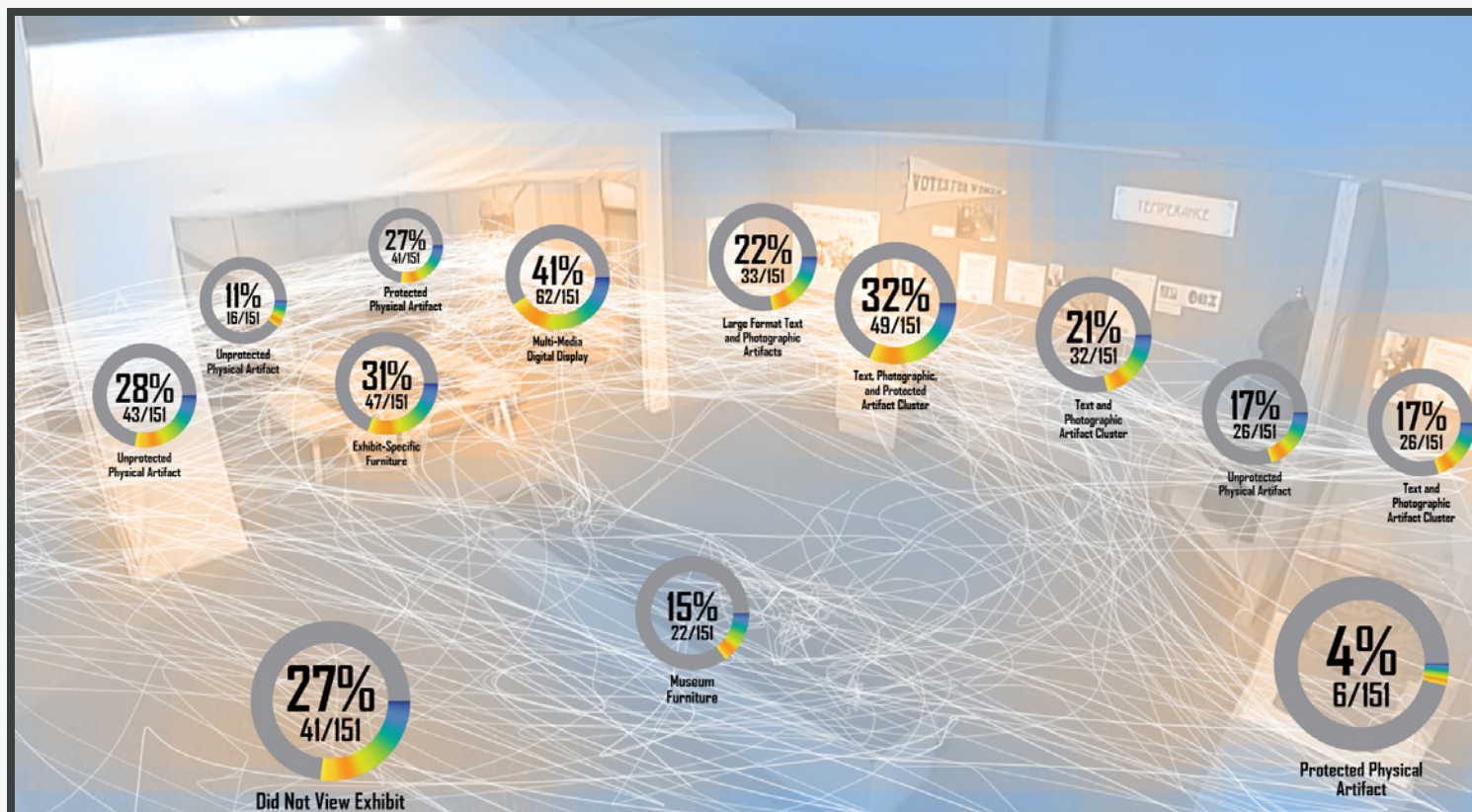
Analysis confirms that the only digital display in the exhibit draws the most attention. The use of a multisensory digital display draws attention both as a visual connection to the video that is playing, and as an auditory feature with voice-over descriptions of what is being displayed on screen. The combination of the visual and audio features creates a high attraction rate to the object. The display receives the highest percentage of engagement with approximately 41% of visitors engaging with the display. It is also notable that visitors who engage with the display tend to devote significant time to this specific piece of the exhibit and often view the exhibit before engaging with other pieces on their path.

This zone also includes three protected and three unprotected physical artifacts. Two unprotected physical artifacts are placed under the tent structure and one along the exhibit wall, while one protected artifact is placed under the tent, one along the wall, and one in the open floor area. Combined, the unprotected artifacts average 18.66% engagement, while protected artifacts average 21%. On the surface, these numbers reveal that protected artifacts have just a slight edge over unprotected artifacts in terms of overall engagement. However, the margin widens significantly when compared based on the actual placement of the artifacts. Between physical artifacts located under the tent, the protected artifact engages at a rate 1.38 times higher than unprotected artifacts, comparing at 27% versus an average of 19.5%. Along the wall, visitors are 1.88 times more likely to engage with the protected display, comparing at 32% versus 17%. Of note is the fact that just 4% of people engaged with the protected artifact in the open floor space, with its placement occurring after the path splits in direction and behavior. When looking at the comparable positions of protected and unprotected artifacts, people appear much more likely engage with the protected display than the unprotected one.

Other key figures of note from exhibit zone A relate to the furniture present in the space and the rate of pass-through visitors. Analysis of the video recordings shows that the third highest rate of engagement across the entire zone is with the exhibit-specific furniture in the tent structure, engage more than double the amount of visitors compared to the museum furniture. This may indicate that because the seating is not viewed as a piece of the actual display, there is little need to engage with it. The flexible museum furniture's placement in the open area may also have an effect the rate of engagement. Another notable figure is that for zone A, 27% of patrons do not view any exhibit pieces, however, this number may be skewed by inadvertently counting museum employees.

Exhibit Zone B
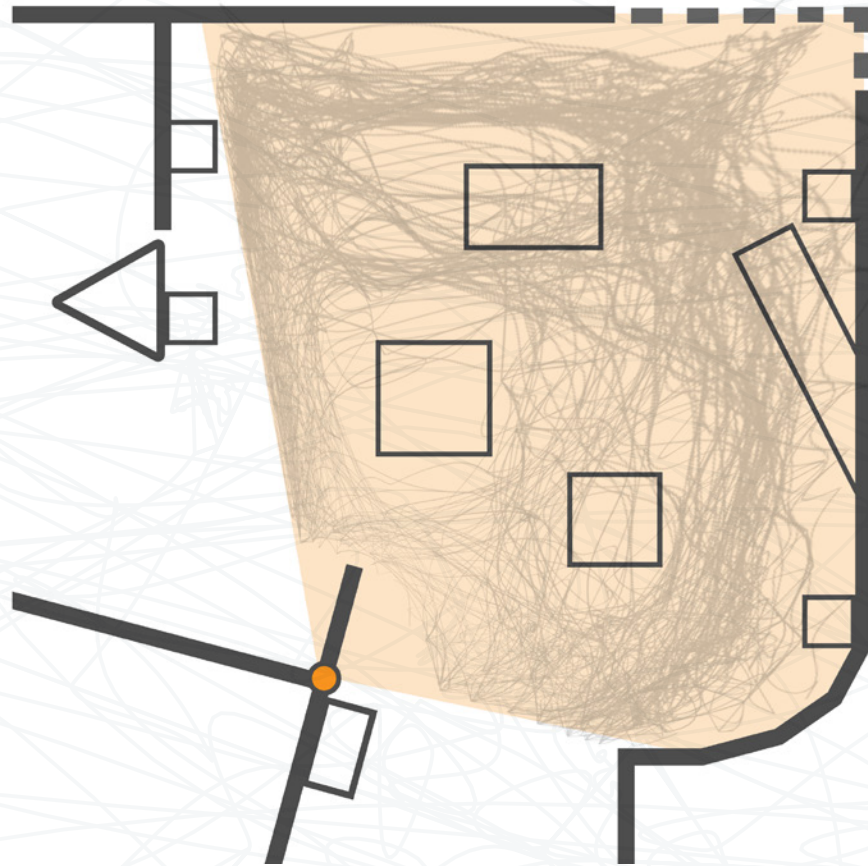
The path through the exhibit itself is very interesting. In Zone B, the path tends to flow through the exhibit in a right to left direction regardless of the visitor's point of entry. Like in zone A the path follows the bordering walls of the exhibit with various pieces displayed in sequence. The contrast from zone A is the way in which visitors handle exhibits in the open floor area. Because the zone appears set up like an enclosed room instead of a corridor, the open space is surrounded by exhibit pieces, with the protected artifacts like islands in the open floor area. Because there is no implied sequence to viewing the floating cases, visitor paths are much less densely defined, with decision making appearing erratic at times. The cases also perform at the low end of the spectrum of engagement rate for zone B, attracting an average of 25.66% of visitors. Like before it appears that people tend to prefer the comfort of following along the walls of an exhibit, rather than being in the open space.
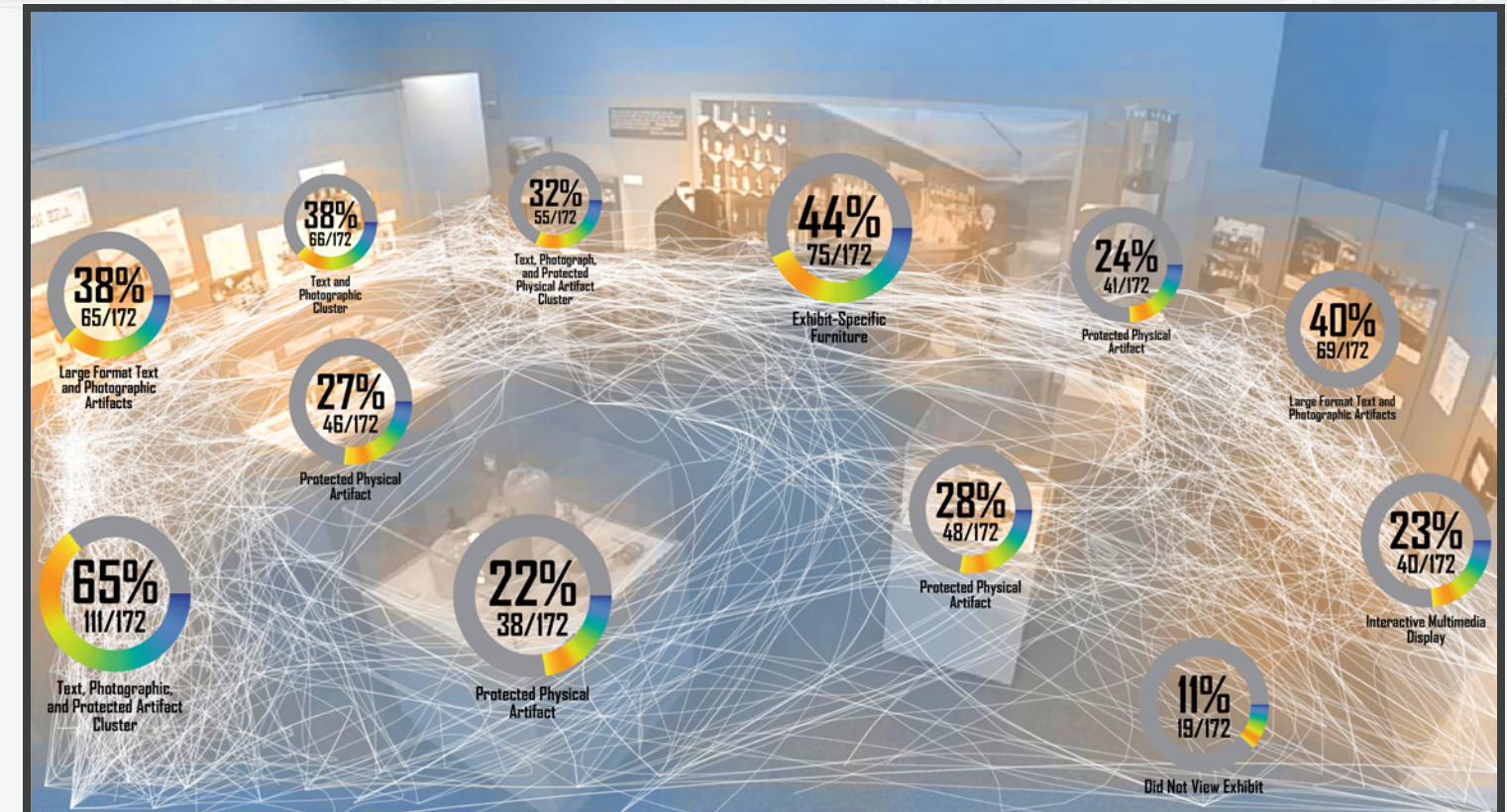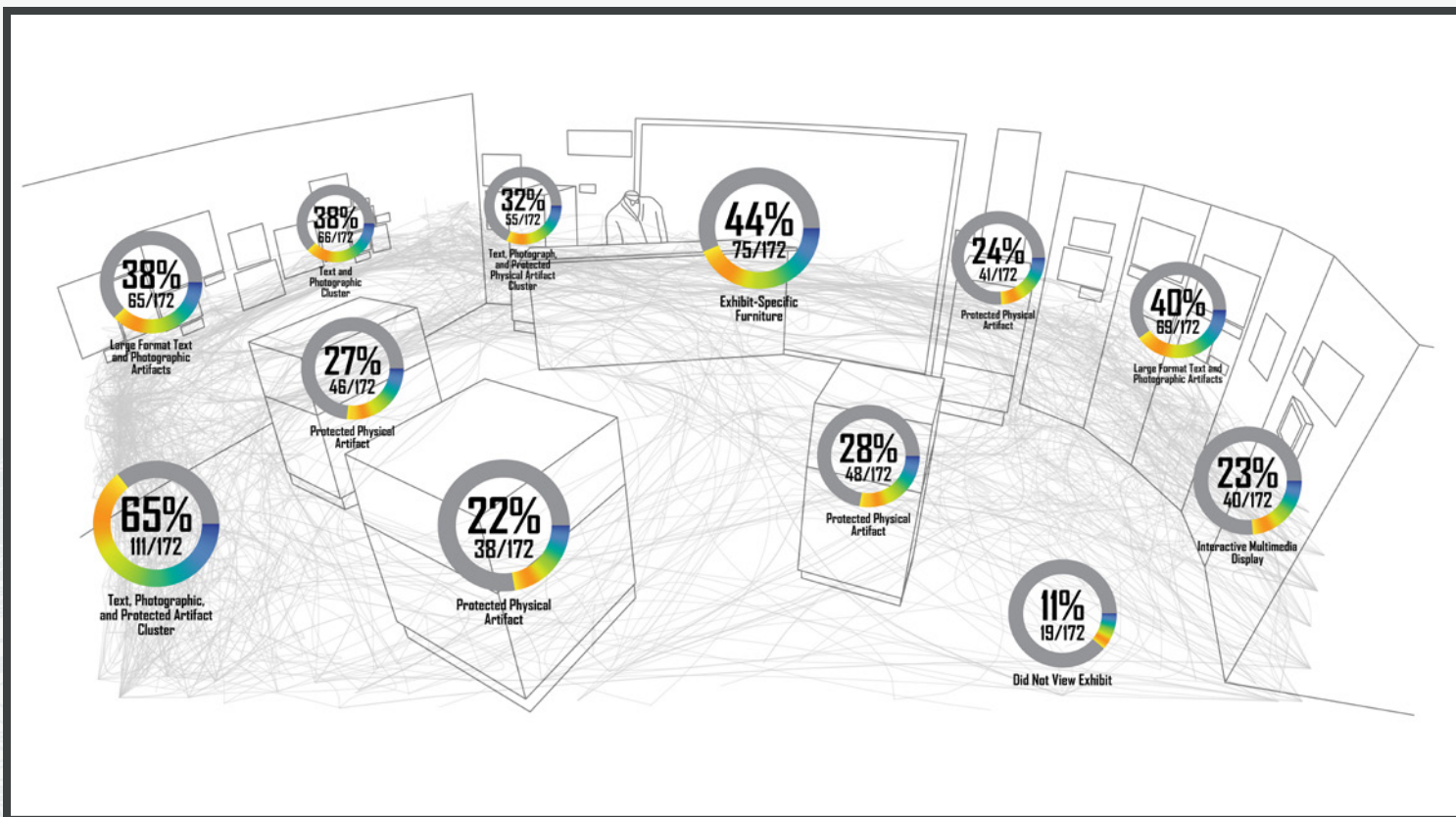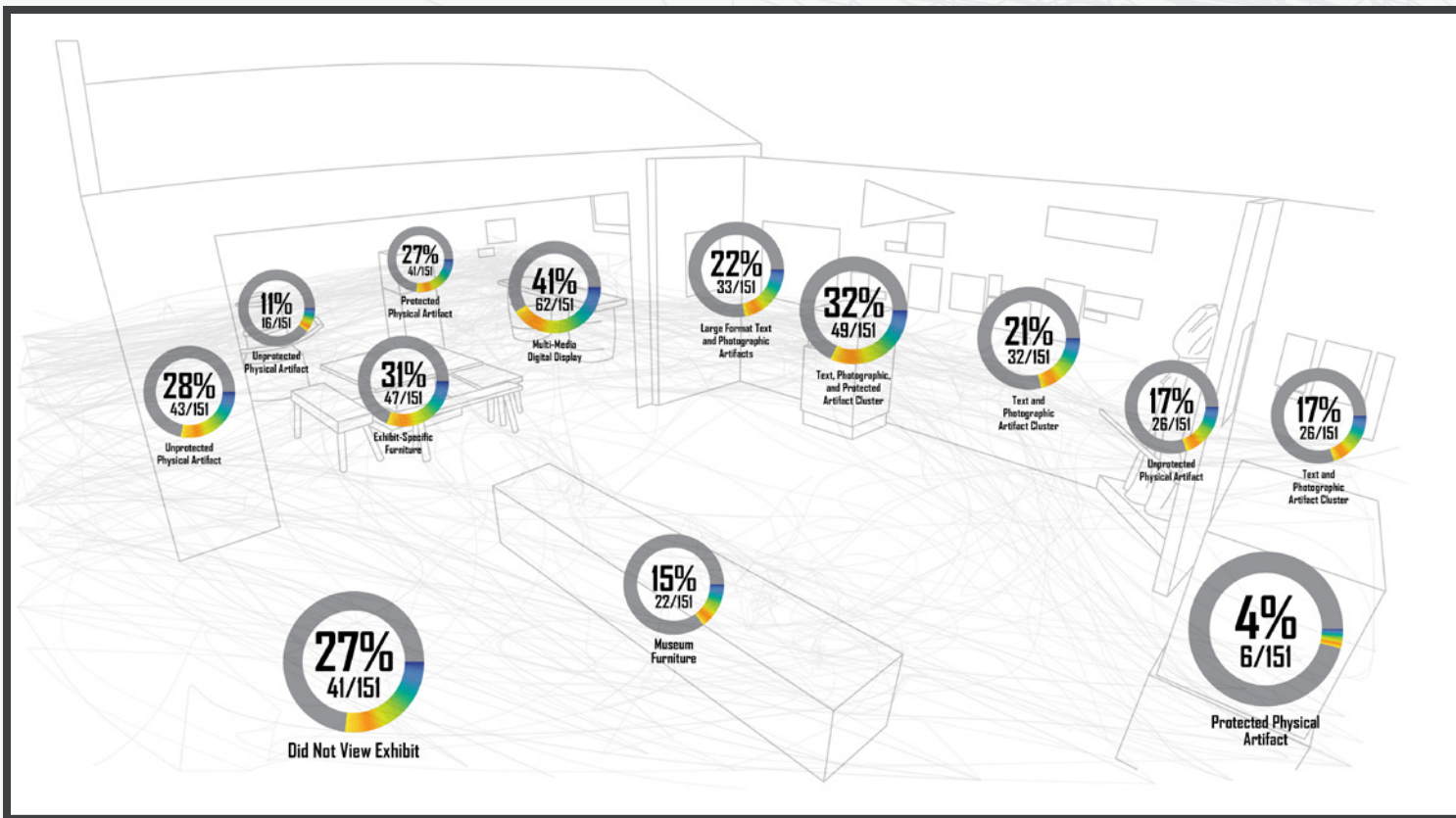
Analysis

The rate of engagement for pieces and clusters in zone B was much higher by comparison than those of zone A. The first cluster in sequence from left to right along the exhibit walls features standard size prints and protected artifacts, this cluster attracts a staggering majority of visitors at a 65% engagement rate. The placement of this cluster immediately off the entry to the zone makes it incredibly visible and accessible to visitors. Other high performing pieces in the exhibit include the exhibit-specific furniture along the sole permanent wall. The piece is a re-creation of a historic bar featured in the banner-sized print behind it. The arrangement provides a forced perspective of the bar coming out of the photo and into the exhibit, complete with a dressed mannequin behind it to serve as the bartender. This piece performs extremely well compared to the furniture and unprotected artifacts in zone A, attracting 44% of visitors to engage with it in some way. A number of pieces perform near 40% attraction with visitors as well, these include two clusters of large-format printed materials (38% and 40%) and another standard size print cluster (38%). Across the board, artifacts in this layout perform better than the previous.

One surprise in the findings was that the interactive digital display in the exhibit did not meet the same rate of engagement as the multisensory display in zone A. As was described in the methodology, the rate of engagement for this specific piece was determine by the number of people who physically interacted with the display, or who engaged after interaction by someone else. The interactive display only engaged 23% of visitors to the exhibit, compared with 41% of visitor engagement with the multisensory display in zone A. This is likely due to the small size of the display, the lack of auditory attraction before initiating the display, and potentially fatigue based on its placement at the end of the exhibit sequence.

Universal Findings

Analysis of both zones yields similar path results despite the differences in layout and placement in the exhibit at large. The presence of these key similarities is reassuring for the potential of predicting visitor behavior in museum exhibit design.

The biggest takeaway from the analysis by far is the path similarities between the two zones. In each zone visitors overwhelmingly prefer to view exhibits from along the wall. In each zone, the path flows in a predominantly left to right direction through the space regardless of the point of entry. The density of the path varies slightly between the two zones but is generally the same. The most visible path differences between the two is visible by the apparent indecision in open space. In both zones visitors entering open space appear less predictable in direction, often wandering slightly as they determine their next destination. The location that this wavering occurs is the difference between the zones, while it occurs in both zones it is much more prevalent in zone B because of the placement of multiple artifacts in the open floor area, compared to just one at the end of the exhibit in zone A.

It also appears that given the choice, visitors appear more attracted to protected artifacts than unprotected artifacts. This is believed to be based on the implied value of placing artifacts behind protective glass. As described in the zone A analysis, this is true across varying placements of the artifacts in the exhibit space.

Finally, statistics point to digital displays providing high rate of attraction when properly sized and providing multisensory stimulation. Interactive digital displays out to be positioned in a manner that demonstrates their functionality and sized to communicate its information well with visitors. Once again, placement in the exhibit space remains an important determinant in the success of the display.
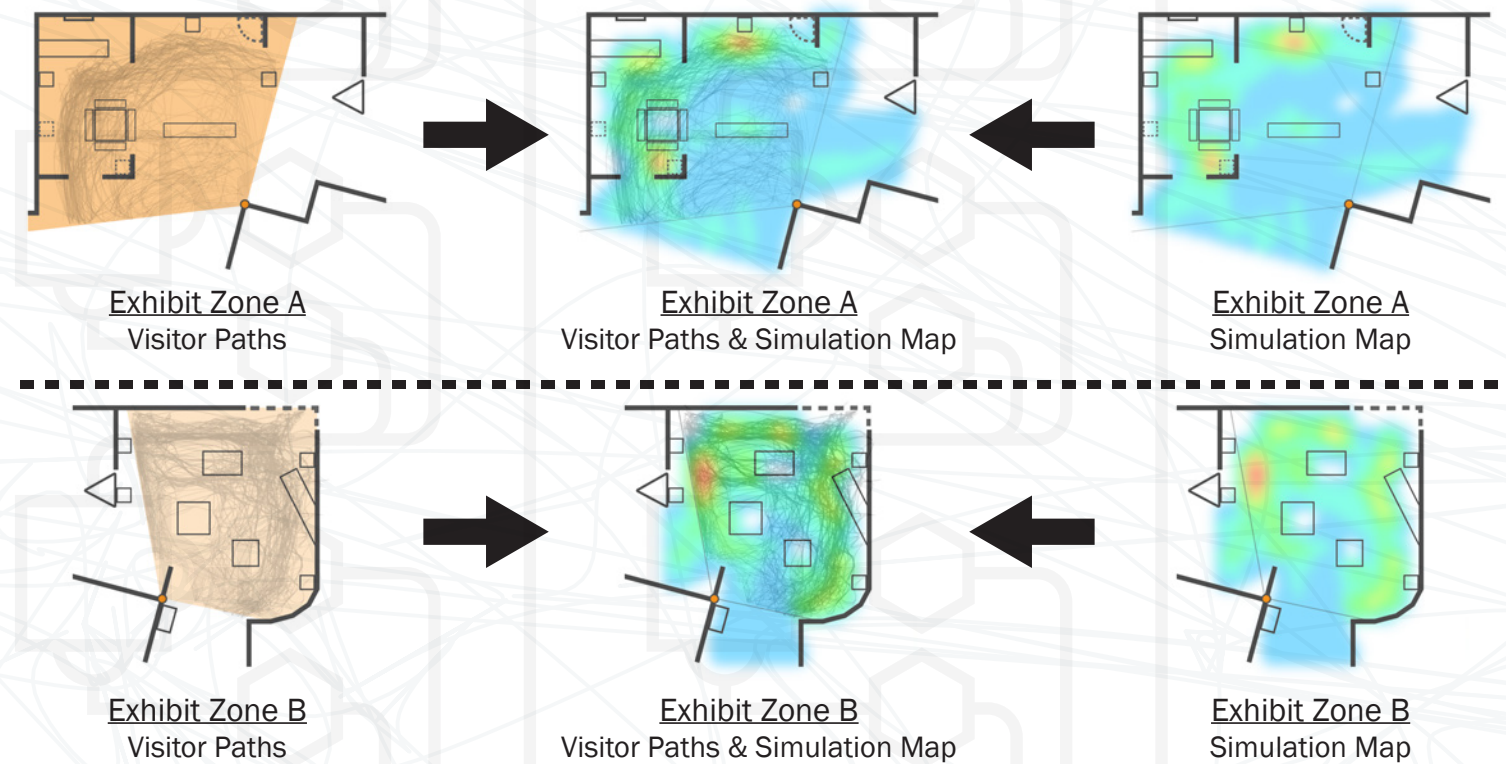
Simulation

Upon completion of the analysis, the statistics derived from the study were used to simulate visitors in the exhibit space to determine if the method had any validity. AnyLogic software was utilized to create a visitor flow definition in the exhibit and using the probability of attraction to determine visitor path. The definition was created in such a way that a sequence of exhibits was created but a specific path was to be determined only by the software, in which the simulated visitors travel by path of least resistance to their destinations. The simulation would be determined a successful indicator for potential design application if the path drawn by simulated visitors matches the real-world pathways.

In each case the results of simulated visitors follow closely the paths of their real-world counterparts. The density mapping created by the AnyLogic software illustrates the paths taken by agents in the simulation model. In each simulation, the lighter colors mark less frequently occupied space by visitors in the exhibit zone. These areas line up well with the open space not frequented by visitors in the actual exhibit. Likewise, the areas where visitors stop most often in the actual exhibit coincide with the colored markers of high density occupation in the simulation model.

The success of the simulation model in adequately reflecting the results of real-world analysis indicate the potential of simulation modeling in the design process to predict visitor behavior in a planned exhibit space. Using the combined averages for visitor engagement with respect to their locations and the exhibit layout type, simulation may be used to test new exhibit designs for pathway optimization. Given a designer's set goals for the project, a possible layout may be tested using simulation to determine if those goals may be successful, providing greater control and understanding of how visitors are actually experiencing the exhibit.

Exhibit Zone A
Visitor Paths

Exhibit Zone A
Visitor Paths & Simulation Map

Exhibit Zone A
Simulation Map

Exhibit Zone B
Visitor Paths

Exhibit Zone B
Visitor Paths & Simulation Map

Exhibit Zone B
Simulation Map

Conclusion

The use of visitor behavior tracking and analysis can be of great use to museum professionals and designers alike. Using established technology commonly used in other applications and adapting process to fit the context, low cost options exist to aid in the design of new museum and exhibit spaces. As shown through this study, the implementation of inexpensive cameras and intensive study of visitor pathways, a number of common behavior patterns can be extrapolated. These patterns have been proven to successfully match simulated outcomes, signaling the potential for this process to be more widely applied in the field of museum design. Architects, planners, and museum staff alike could benefit from the implementation of the process utilized in this study to better understand their patrons and predict how future exhibitions will be experienced. Using standards established through greater study of this methodology, baseline engagement rates could provide a starting point for analysis, or individual study of existing museums can more specifically predict visitor behavior. Utilizing this process, museum designers may now have better control and a quantitative understanding of how visitors engage with exhibition spaces.