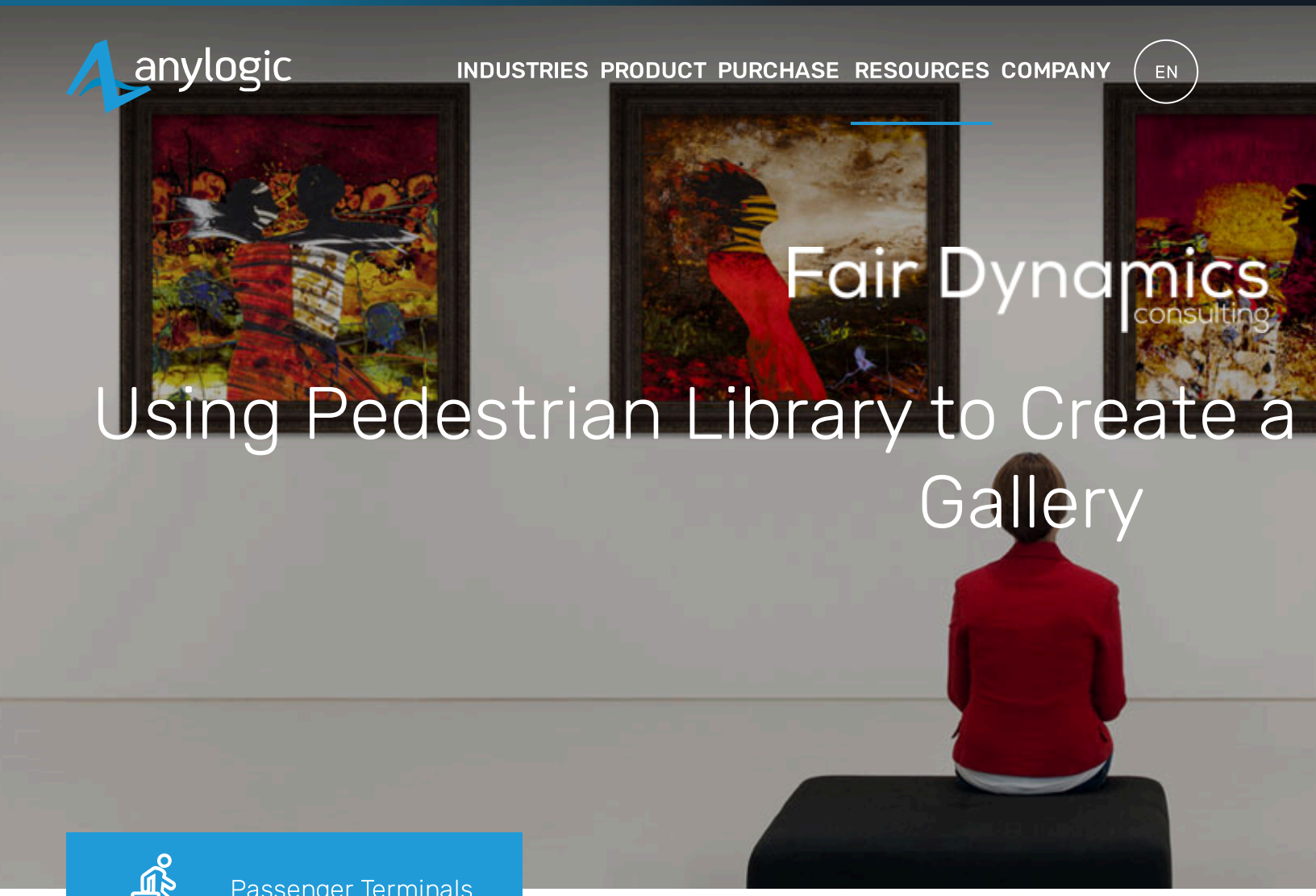


Using Pedestrian Library to Create a Gallery

Passenger Terminals

Problem

Fair Dynamics, a Milan based consulting company with a distinct aspect towards simulation modeling, was engaged in developing The Ametria project, a contemporary art exhibition held in the Athens' Benaki Museum.

The general purpose of the project was to steer visitors'

was advantageous. It let engineers see where the artworks could be placed, as well as show how people could move inside the gallery.

Different layouts were tested, including:

- Presence of critical areas (too high or too low density of visitors)
- Percentage of artworks that could be observed
- Pathway of each visitor inside the gallery
- Visitors' satisfaction, measured in terms of artworks observed

Solution

The movement of visitors inside the gallery was modeled with the help of the AnyLogic Pedestrian library. This library allowed modelers to simulate the behavior of agents (representing visitors), moving according to predetermined rules, and adjust distance and speed according to the crowd density.

Thanks to the library, it was possible to join the advantages of pedestrian dynamics with the power of the agent-based modeling approach, providing visitors with specific features and behaviors, and allowing visitors to interact with artworks. This approach helped define:

- Involvement rate, which was based on time spent per artwork and inside the gallery.
- Mood, affected by anxiety, proximity of other visitors, achievements in observing artworks, and other variables.
- Physical state of a visitor (fresh, tired, relaxed), and

from surveys of people who visited other galleries, to make the model more accurate. The visitors' walkthrough is described below:

- Visitors entered the gallery according to a defined schedule, without knowing the artworks exhibited.
- Visitors joined a group that has not yet reached its maximum size and move along the gallery's areas, trying to observe a greater number of artworks.
- While moving along the gallery, visitors established connections with the artworks, which are modeled as agents as well. To consider an artwork observed, visitors had to follow the rules particular to each artwork. (For example, look at the masterpiece from a particular location).
- Visitors demonstrated different involvement degrees towards the exhibition, and this affected time and effort spent in the gallery. While people walked through the artworks, they got tired, until they reached a threshold level that forced them to stop as soon as they reached a rest area.

The last step deserves greater attention. According to exhibition organizers, it was vital to consider visitors' specific features, including, preferences, goals, interest in the exhibition, mood, and others. It also implied that spending too much time without observing artworks moved a visitor to a progressive state of dissatisfaction that, at its maximum peak, forced them to exit the gallery.

The contractors paid particular attention to the model's interface. Providing a high level of usability, it had a material-design look, was easy to read, and had

This was achieved through the flexibility of AnyLogic in integrating the components, provided by the Java Swing class. Most of the interface elements were easily adjustable, so the clients could introduce any dynamic input parameters or empirical data into the model, including:

- The opening and closing time of the exhibition
- How much time the visitor should spend at each artwork or area
- Percentage of visitors interested in the exhibition

After setting up and launching the model, one could see people entering the hall. When people started

entire area. The model also allowed enhanced statistics, including the following:

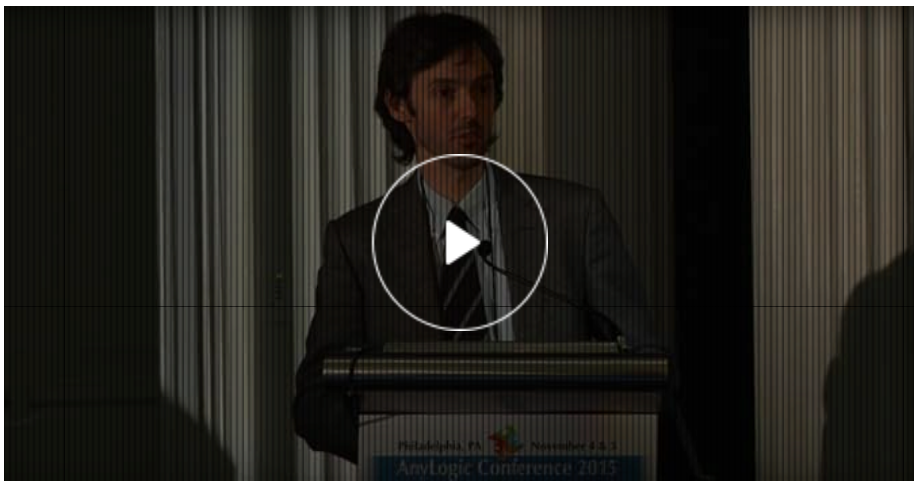
- Number of people in the gallery and the distance they covered
- Distribution for groups and group members
- Average time a person spent in a certain area of the gallery
- Number of artworks observed and visitors per each artwork
- Pathways for each visitor

Modelers also took emergency situations into account, so the statistics could show total time spent on safe evacuation.

for crowdedness in front of particular paintings, which allowed the designers to eliminate them using a density map. Apart from this, the model allowed the customer to test various layouts to find a suitable one for future exhibitions.

Much was done to make the model more customer oriented. The contractors tried to improve the user experience through intuitive interface, visual indicators, and documentation tools. For instance, organizers could gather multiple pathways' information to produce 1000 different exhibition booklets.

The model also offered the possibility to test the maximum number of visitors that could concurrently visit the exhibition, avoiding overcrowding problems. This feature helped in modeling a plan for safe evacuation.



Project presentation by Luigi Manca and Roberto Grugni

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