NEW YORK FALLS SHORT IN HOMELAND SECURITY FUNDING

New budget allocation models developed by Sanjay Mehrotra, professor of industrial engineering and management sciences, suggest that New York City appears underfunded for protection against terrorist threats. The study also shows Chicago as underfunded, while Los Angeles appears overfunded.

Mehrotra and his team analyzed budgets for five fiscal years (2005–09) for 10 major US urban areas under a variety of terrorist-attack scenarios. The researchers found the funding received by New York in 2009 was around 30 percent of the total money allocated by the Department of Homeland Security to the 10 areas. According to the Northwestern models, the funding should have ranged between 33 and 49 percent. This would translate to a net increase of anywhere between $15 million and $92 million above the actual level of funding New York received in 2009.

OIL, MAZES, AND CANCER

Bartosz Gryzbowski, the Kenneth Burgess Professor of Physical Chemistry and Chemical Systems Engineering, was interviewed on the BBC radio program Material World regarding his research that shows how droplets of oil can make their way through complex mazes. Gryzbowski created a system in which the droplets were powered by a combination of acid/base chemistry and surface-tension effects. When subject to a pH gradient within a maze, the droplets moved toward regions of low pH and found the shortest possible path through the maze. The technique could have implications in cancer therapy, as cancers are more acidic than the rest of the body. Researchers might design drugs to follow the pH gradient to cancer cells.

Published in January in the Journal of the American Chemical Society, the research has been featured in Science, Nature, and Popular Science, among other publications.

RATING AND RANKING AND SOCCER PLAYERS

Luis Amaral, professor of chemical and biological engineering (below), combined his love of soccer with his research team’s computational skills to measure and rank the success of soccer players based on an objective measure of performance instead of subjective opinion. The results were published in PLoS ONE, a journal published by the Public Library of Science. Amaral and his team were able to objectively rank the performances of all the players in the 2008 European Cup tournament. Their results closely matched the consensus of sports reporters who covered the matches as well as the team of experts, coaches, and managers that chose players for the “best of” tournament teams.

To find a quantitative way to rank players, graduate student Josh Waitzman, a coauthor of the paper, first wrote software to pull play-by-play statistical information from the 2008 European Cup website. This type of extensive statistical information is usually only gathered for important matches, Amaral says. Then Amaral and Jordi Duch, the paper’s first author and a faculty member at Universitat Rovira i Virgili in Spain, used the data to quantify the performance of players by generalizing methods from social network analysis. They mapped out the flow of the soccer ball between players in the network and shooting information and analyzed the results.

“We looked at the way in which the ball can travel and finish on a shot,” says Amaral, who also is a member of the Northwestern Institute on Complex Systems and an Early Career Scientist with the Howard Hughes Medical Institute. “The more ways a ball can travel and finish on a shot, the better that team is. And, the more times the ball goes through a given player to finish in a shot, the better that player performed.”

This research has been featured in several national media outlets, including MSNBC, the Washington Post, Scientific American, and Forbes.

A NEW HOME FOR THE CENTER FOR LEADERSHIP

The Center for Leadership at Northwestern has a new academic home at the McCormick School. McCormick will host the center’s academic offerings, serve as a springboard for the center’s connections with the University community, and provide faculty appointments to its leadership team.

“We’re excited to join McCormick because we think that leadership will complement the other offerings of the school,” says Adam Goodman, director of the Center for Leadership. “McCormick students will be called upon to be leaders in their careers, so it’s important for the school to introduce them to the concepts of effective leadership throughout their education.”

The Center for Leadership started in 1990 as the Undergraduate Leadership Program. For 20 years the program provided a popular undergraduate certificate program in leadership, and more than 2,500 students have participated in the program.

“The Center for Leadership is an excellent addition to the curricular and extracurricular activities offered to our students,” says Dean Julio M. Ottino. “Combined with other new initiatives at McCormick — such as the Segal Design Institute and the Farley Center for Entrepreneurship — we are building offerings to create whole-brained engineers. Our students emerge with deep technical knowledge, which is at the heart of engineering, but we must also instill leadership, entrepreneurship, and design skills into their thinking in order to prepare them to have maximum impact on the world.”