

**McCormick**

Northwestern Engineering

# Humanitarian and Non-Profit Logistics

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# Our Mission

Our strength is in *focused, high-impact* projects that address the unique needs of disaster relief agencies and non-profit organizations. We concentrate on targeted research with concrete benefits.

**Humanitarian logistics** involves the coordination of people, organizations, and materials to deliver goods and services to people in need. **Non-profit logistics** focuses on the operations of non-profit organizations at local, regional and national levels.

At Northwestern University, researchers are actively engaging in many areas of humanitarian and non-profit logistics. Projects focus on approaches to develop and **apply modeling and solution technology to promote welfare and equity through the efficient delivery of goods and services**, with an emphasis on implementation with our partner organizations in the field.

# Focused, High Impact Research in Humanitarian and Non-Profit Logistics

## Why study humanitarian and non-profit operations?

Logistics problems differ significantly from those faced in the commercial sector and during “normal” conditions

Advances needed in *information technologies, optimization techniques, network analysis, and decision sciences* to address these unique problems

## Why study humanitarian and non-profit operations at Northwestern?

Existing core of research in the above methodological areas and an emerging core in application areas

Top-tier programs at McCormick, Kellogg, and Feinberg provide opportunities to build on strengths and expand the core

## Participants

- Faculty leaders from IEMS and Transportation Center, Feinberg School of Medicine (Emergency Medicine)
- PhD students
- Undergraduates in senior design, independent research, internships
- Faculty from McCormick, Northwestern, and other universities
- Industry, non-profits, non-government agencies and government agencies
- Research sponsors

# Highlights of Humanitarian Logistics: Prior work

## Sample projects

- Dynamic multi-period routing with multiple sources of uncertainty
- Search and rescue grid optimization
- Logistics coordination platform design
- Balancing equity, efficiency and efficacy in relief aid distribution

## Funding sources

- NSF
- Google
- CCITT
- Individual donors
- McCormick, TC, TGS funding

## Partners

- Aidmatrix Foundation
- Tipton Country, TN

## Outreach & Publications

- Dean's Seminars: "Cracking Open Disaster Response and Reconstruction"
- Industrial Engineering Research Conference presentation: "Decentralized Approaches to Logistics Coordination in Humanitarian Relief"
- Relief routing paper accepted to the 19th International Symposium on Transportation and Traffic Theory (20% acceptance rate)

## Linkages

- Participant on CEE panel: "Infrastructure—Past, Present, and Future"
- Guest lectures in courses in School of Communications & Feinberg
- Joint seminars & research meetings (CEE/ESAM)

# Highlights of Humanitarian Logistics: Current projects

## Sample projects

- Decision-making tools for distribution networks in disaster relief
- Integrating routing research with GIS technology
- Supply chain analysis for long-term humanitarian aid in Africa
- Robust and dynamic planning for mass participation events

## Funding sources

- NSF (current and pending)
- CCITT
- Center for Engineering and Health
- Individual donors
- McCormick

## Partners

- Action Against Hunger - USA
- Chicago Marathon Incident Command

## Outreach & Publications

- Keynote address: "Research Challenges in Humanitarian Logistics," at the Second International Conference on Evacuation Modeling and Management
- Media: WBBM Chicago; Panelist at the Woodrow Wilson Center
- Honorable Mention at INFORMS Annual Meeting for IEMS Senior Design Project: "Integration of Real Time Data in Urban Search and Rescue"

## Linkages

- Jointly advising projects with faculty in Feinberg School of Medicine
- Transportation Center: Conf. on Evacuation Modeling & Management
- New course to be offered Winter 2014 on Humanitarian and Non-profit Logistics

# Highlights of Non-profit Logistics: Prior work

## Sample Projects

- Food distribution operations for hunger relief agencies
- Improved routing for interlibrary loan material delivery
- Community-based operations research
- Facility location modeling and decisions for food bank operations

## Funding sources

- NSF
- Individual donors
- Dow student award
- McCormick, TGS, TC funding

## Partners

- North Suburban Library System
- Northern Illinois Food Bank
- Northside Anti-hunger Network

## Outreach & Publications

- AAAS symposium: “Doing Good with Good OR”
- Invited contribution to INFORMS article on “Bringing OR to the Masses”
- Northern Illinois Food Bank warehouse relocation project
- J. Warfel wins Dow Sustainability Innovation Challenge
- Co-authored seminal paper on community-based operations research

## Linkages

- Planning group for law school class on health access in refugee camps
- Global health planning group
- NSF Reach for the Stars Program: teaching modules on non-profit logistics

# Highlights of Non-profit Logistics: Current projects

## Sample Projects

- Improved access to community-based health care through improved scheduling policies
- Decision models to improve recycling for hunger relief agencies
- Developing resource allocation models for STEM programs in elementary education

## Funding sources

- NSF
- Murphy Society
- Individual donors
- McCormick & Transp. Center

## Partners

- Mobile C.A.R.E. Foundation
- Northside Anti-hunger Network
- School consortium for education project

## Outreach & Publications

- Mobile C.A.R.E. work selected for presentation at Stanford's Operations Research for the Public Interest Conference
- Case study on health care access available from HBS
- Upcoming conference presentations on recycling project and underlying routing models, additional presentations and journal submissions on health care access work

## Linkages

- Collaboration with MEDS group in improving access to health care; possible extensions to Children's Memorial group
- International collaborations in Australia, Austria, and India
- NSF proposal submitted with Communication Science and Education