

# **Bellagio Conference Final Report**

## **Humanitarian Logistics: Networks for Africa**

**Conference Organizer: Dr. Anna Nagurney  
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University of Massachusetts  
Amherst, Massachusetts 01003**

**Submitted to the Rockefeller Foundation**

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**Abstract:** This report is based on the conference that took place May 5-9, 2008 at the Rockefeller Foundation's Bellagio Center on Lake Como in Italy. The conference website: <http://hlogistics.som.umass.edu/> contains the available presentations, as well as additional information and links.

This Bellagio Center conference brought together academics, institute and corporate representatives, along with members of leading humanitarian agencies and NGOs, in order to focus on the major research and practical needs of humanitarian logistics at a time of increasing risk and uncertainty, with a focus on Africa. The conference pushed the knowledge of both research and practice in an intense, collaborative setting. It convened individuals from the continents of Europe, Africa, and North America to exchange expertise and to build bridges for the enhanced future of humanitarian logistics. Since education is a necessary vehicle for the transfer of research into practice, the identification of partnerships across the continents for education on humanitarian logistics was also a topic of the conference.

The conference, which was 11 months in planning, coincided with the aftereffects of Cyclone Nargis in Myanmar/Burma, and preceded by a few days the earthquake in Sichuan Province, China.



**A summary of key points and insights gained at the conference is now given. These are based on the presentations delivered as well as the in-depth discussions that took place during the conference. The list of invited speakers, the conference program, and notes on the presentations are available below.**

- **The multidisciplinary nature of the discussions and the interdisciplinary background of the speakers reinforced that *humanitarian logistics* must be addressed from both quantitative and qualitative perspectives through the documentation of best practices and case studies, the development of computer-based models and decision support technologies, accompanied with the appropriate instructional and educational materials and courses.**
- **Education on logistics, in general, and humanitarian logistics, in particular, is of paramount importance to Africa. The number of academic institutions with leadership in this area needs to grow.**
- **Much can be gained from the exchange and knowledge transfer among practitioners/ researchers/educators.**
- **Education on logistics is essential to the future of Africa since it impacts the economy through the efficient and timely delivery of goods and services; the delivery of healthcare, infrastructure maintenance and enhancements, and disaster preparedness, response, and reconstruction.**
- **The education of women logisticians in Africa is imperative in order to capture the necessary skills and gender and cultural sensitivity required during times of disaster response and reconstruction.**
- **A one laptop program for humanitarian logisticians with appropriate software would be extremely valuable and useful.**

**It is extremely important and timely to raise and enhance the discipline of humanitarian logistics through:**

- 1. The development of e-learning course offerings that are accessible to practitioners in the field and members of NGOs;**
- 2. The professionalization of humanitarian logistics through appropriate certificate programs;**
- 3. The awarding of fellowships to African students and humanitarian logisticians to acquire higher education on this topic;**
- 4. The initiation of field-based experiences for students and faculty from the US and other universities to work in Africa on logistics and humanitarian logistics exercises;**
- 5. The establishment of student-based exchanges with African universities;**

- 6. The establishment of an African-based Center for Humanitarian Logistics with partner institutions in the US and Europe, for example;**
- 7. Funding of a conference on humanitarian logistics to take place in Africa;**
- 8. The establishment of a repository for data associated with humanitarian logistics operations in Africa (and beyond) in order to enable timely academic studies and to grow knowledge in this area;**
- 9. The identification of how to enhance the involvement of corporations and their understanding of humanitarian needs and the associated social responsibilities.**

**In order to allow for the most timely and widest dissemination of the findings to-date, the website for the conference was created and is at: <http://hlogistics.som.umass.edu/> This website contains the available prepared presentations, the conference program, additional information, and links, and will be updated as new materials and findings are received. It will also contain announcements of any future activities that are an outgrowth of this Bellagio Center conference. In addition, the conference convener, Dr. Anna Nagurney, has begun discussions with a publisher about the possibility of an edited volume of the proceedings of the conference.**

**The mix of invited speakers/participants at *the Humanitarian Logistics: Networks for Africa* Bellagio Center conference, which included educators and researchers as well as practitioners from leading academic institutions as well as NGOs and even from a corporation resulted in new professional and personal links being forged. The diversity of the participants and their experiences enabled a great intensity, depth, and breadth in the discussions. Plans are ongoing to identify the best possible funding agencies to pursue additional support for the initiatives identified at the conference and outlined above.**

**The venue for the conference could not have been more ideal. The speakers were able to work in a beautiful and serene setting with all their meals, their conference work facilities, as well as housing, provided for by the Bellagio Center through its Frati Meetings program. The venue allowed for intense and deep discussions which were intellectually, professionally, and personally deeply enriching and rewarding for the conferees. New professional connections were made as well as new friendships and bonds. Most importantly, the idyllic venue, coupled with the theme of the conference, reinforced that members of this group need to lead in furthering education, research, and practice, and their associated synergies, on humanitarian logistics with a focus on building partnerships with Africa.**

## Invited Speakers

**Mr. Antony K. COOPER** -- Mr. Cooper is an Operating Unit Fellow in Logistics and Quantitative Methods at the Center for Scientific and Industrial Research (CSIR) in Pretoria, South Africa. Mr. Cooper brings fundamental expertise from a research organizational standpoint on the topic of the conference.

**Dr. Jose M. CRUZ** -- Dr. Cruz is an Assistant Professor in the Department of Operations and Information Management at the School of Business at the University of Connecticut in Storrs, Connecticut. Dr. Cruz brings both personal and professional expertise on logistics, supply chains, corporate social responsibility, and life in Africa.

**Mr. George FENTON** -- Mr. Fenton is Associate Supply Chain Director for World Vision International's (WVI's) Humanitarian and Emergency Affairs Division. In 2002, he set up an inter-agency working group for East Africa, which promotes collaboration on humanitarian logistics. In addition, in conjunction with IFRC and UN-WFP logistics offices, he established the Global Fleet Forum. He has over two decades of relief and development experience, in both the private and NGO sectors.

**Dr. Anton KLEYWEGT** -- Dr. Kleywegt is an Associate Professor in the H. Milton Stewart School of Industrial and Systems Engineering, Georgia Institute of Technology in Atlanta, Georgia. Dr. Kleywegt is an expert on transportation and logistics and has taught several courses on supply chain management, stochastic optimization, and game theory. In 2006, he participated in a National Science Foundation Workshop on Relief Systems in Kenya, Africa.

**Dr. Gyongyi KOVACS** -- Dr. Kovacs is an Assistant Professor of Supply Chain Management and Corporate Geography at the Swedish School of Economics and Business Administration, Helsinki, Finland. She is one of the leaders of the Center for Humanitarian Logistics based at her university.

**Dr. Emmett J. LODREE, Jr.** -- Dr. Lodree is an Assistant Professor in the Department of Industrial and Systems Engineering at Auburn University. He has taken part in several National Science Foundation workshops, including one for the development of minority faculty in engineering. His expertise and interests lie in humanitarian logistics and disaster emergency preparedness. His family home was severely damaged during Hurricane Katrina and, hence, his personal interest in the topic of the proposed Bellagio conference. He has received several honors and awards and has presented his research at major conferences.

**Dr. Charles MBOHWA** -- Dr. Mbowha is a Senior Lecturer in the Department of Quality and Operations Management at the University of Johannesburg, South Africa. He was formerly a Professor in the Department of Mechanical Engineering at the University of Zimbabwe, Africa. He was a Fulbrighter at the Georgia Institute of Technology. Dr. Mbowha is an expert

on transportation and logistics with a focus on challenging environments and applications to Africa; he also has expertise in energy and sustainability.

**Dr. Anna NAGURNEY** -- Dr. Nagurney is the John F. Smith Memorial Professor and Director of the Virtual Center for Supernetworks at the Isenberg School of Management at the University of Massachusetts at Amherst. Dr. Nagurney is a widely published author and recognized authority on logistics and transportation networks, as well as related network systems. In March 2004, she organized a research team residency at the Bellagio Center on dynamic networks. She has held appointments at Brown University, KTH in Sweden, at MIT, at SOWI Business School in Innsbruck, Austria, and was also a Science Fellow at the Radcliffe Institute for Advanced Study at Harvard University. She is the recipient of two Fulbright awards.

**Ms. Agnes NYAGUTHIE** -- Ms. Nyaguthie is the Regional Logistics Coordinator for OXFAM GB and is based in Pretoria, South Africa. She is with the Department of Logistics and Property. Ms. Nyaguthie is responsible for the logistics of six countries in her region of Africa. Prior to joining OXFAM, she was with CARE in Somalia. She brings years of practical expertise in logistics to the conference agenda.

**Dr. Panos M. PARDALOS** -- Dr. Pardalos is a Distinguished University Professor and Co-Director of the Center for Applied Optimization, University of Florida, Gainesville, Florida. Dr. Pardalos has been recognized for his research by notable international accolades, including honorary doctorates, and has authored, co-authored, and edited several volumes on supply chains. He has supervised numerous doctoral dissertations and is an INFORMS Fellow and a Fulbrighter. He is also an editor of several major journals.

**Dr. Berc RUSTEM** -- Dr. Berc Rustem is a Professor of Computing at the Department of Computing at Imperial College, London, United Kingdom. Dr. Rustem is an authority on risk management and decision-making under uncertainty and worst-case models. He has supervised doctoral dissertations of African students. He has served as an editor of several major journals and is on the editorial boards of several journals as well as book series.

**Dr. Paul THOMPSON** -- Dr. Thompson is Manager, Operations Research, at Northrop Grumman IT in the Analysis and Decision Support Department. He is based in McLean, Virginia. Dr. Thompson formerly led the Operations Analytics team efforts with IBM's Public Sector Supply Chain Management practice and has more than 25 years experience in academia, consulting, and industry. He is an expert on solving complex problems in logistics. Prior to IBM, he served as Professor of Supply Chain Management at the MIT-Zaragoza International Logistics program in Spain.

**Mr. Rolando TOMASINI** -- Mr. Tomasini is a Research Associate and Program Coordinator with the Research Group on Humanitarian Logistics,

led by Professor Luc Van Wassenhove, at INSEAD, a top-ranked business school based in France. Mr. Tomasini has worked with the Pan American Health Organization in Central America, the World Food Program in Southern Africa, and with the United Nations Joint Logistics Center on different initiatives, including training and the Sudanese operation. He has written several case studies on humanitarian logistics as well as articles and reports and has lectured widely on the subject.

**Dr. Cosmas ZAVAZAVA** -- Dr. Zavazava is the Head, Least Developed Countries, Small Island Developing States, and Emergency Telecommunications at the International Telecommunications Union (ITU) in Geneva, Switzerland. Dr. Zavazava brings intellectual expertise from the field of telecommunications and its role in disaster management and humanitarian operations. He is a widely sought speaker and expert on this subject.

**International Conference:  
*Humanitarian Logistics: Networks for Africa*  
Program**

<http://hlogistics.som.umass.edu/>

**Rockefeller Foundation's Bellagio Center  
Lake Como, Italy, May 5-9, 2008**

**Convener: Anna Nagurney  
University of Massachusetts at Amherst, USA**

**Monday, May 5, 2008**

Conferees arrive in Milan and are transported to the Bellagio Center via two shuttles provided by the Center. The conference takes place at the Frati Building where the conferees reside and also have their meals.

Dinner takes place at 7:30PM with an informal get-together afterwards.

**Tuesday, May 6, 2008**

**Theme: Experiences from the Field**

**8:00-9:00 AM Breakfast**

**9:30-10:00 AM *Opening Remarks and Welcome* - Anna Nagurney, University of Massachusetts at Amherst, USA**

**10:00-10:40 AM Agnes Nyaguthie, Oxfam-GB, Pretoria, South Africa  
*The Important Role of Humanitarian Logistics***

**10:40-11:20 AM Cosmas Zavazava, International Telecommunications Union, Geneva, Switzerland  
*Bridging the Last Mile Gap through Telecommunications/ICT in Disaster Management***

**11:20-11:40 AM Break**

**11:40-12:20 PM Charles Mbohwa, University of Johannesburg, South Africa  
*Identifying Challenges and Collaboration Areas in Humanitarian Logistics: A Southern African Perspective***

**12:20-12:40 PM Discussion**

**1:00-2:30 PM Lunch**

**2:30-3:10 PM Anna Nagurney, University of Massachusetts at Amherst, USA**  
***Supply Chain Network Models for Humanitarian Logistics: Identifying Synergies and Vulnerabilities***

**3:10-3:50 PM Panel: *What is Needed to Improve the Delivery of Humanitarian Logistics?***

**7:00-8:30 PM Cocktails and Dinner; Dinner at the Bellagio Center's Villa Serbelloni with Bellagio Center Residents and Introductory Remarks by Ms. Pilar Palacia, the Managing Director of the Bellagio Center. After dinner, conferees mingle at the Villa for further discussions and conversations.**

**Wednesday, May 7, 2008**

## **Theme: Research on Humanitarian Logistics**

**8:00-9:00 AM Breakfast**

**9:30-10:10 AM Rolando Tomasini, INSEAD, Fontainebleau, France**  
***Private Sector Engagement in the Humanitarian Sector***

**10:10-10:50 AM Anton Kleywegt, Georgia Institute of Technology, Atlanta, USA**  
***Dynamics and Longer Term Consequences of Humanitarian Relief***

**10:50-11:10 AM Break**

**11:10-11:50 AM Gyongyi Kovacs, Swedish School of Economics and Business Administration, Helsinki, Finland**  
***The HUMLOG Group -- A Research Network on Humanitarian Logistics***

**11:50-12:30 PM Discussion**

**1:00-2:30 PM Lunch**

**2:30-3:10 PM Emmett J. Lodree, Jr., Auburn University, Alabama, USA**  
***Inventory Planning for Hurricane Events***

**3:10-3:50 PM Paul Thompson, Northrup Grumman IT, McLean, Virginia, USA**  
***Supply Chain Analytics for Humanitarian Logistics Transformation***

**3:50-4:10 PM Break**

**4:10-4:50 PM Panel: *What Research into Humanitarian Logistics is Needed?***

**7:00-8:30 PM Cocktails and Dinner**

**Thursday, May 8, 2008**

**Theme: Building Networks for Africa:  
Education, Research, and Partnerships**

**8:00-9:00 AM Breakfast**

**9:30-10:10 AM George Fenton\*, World Vision International, Nairobi, Kenya**  
*Partnering for Relief - Optimizing Logistics: An Inter-Agency Approach: Why and How?*

**10:10-10:50 AM Antony K. Cooper, CSIR, Pretoria, South Africa**  
*Some Thoughts on Humanitarian Logistics and Quantitative Methods*

**10:50-11:10 AM Break**

**11:10-11:50 AM Jose M. Cruz\*\*, University of Connecticut, Storrs, USA**  
*Corporate Social Responsibility for Sustainable Development in Africa*

**11:50-12:30 PM Discussion**

**1:00-2:30 PM Lunch**

**2:30-3:10 PM Panos M. Pardalos, University of Florida, Gainesville, USA**  
*Detecting Critical Nodes in Sparse Graphs*

**3:10-3:50 PM Berc Rustem, Imperial College, London, UK**  
*Decision Making Under Uncertainty Worst-case Analysis & Expected Value Optimization*

**3:50-4:10 PM Break**

**4:10-4:50 PM Panel: *What Partnerships Can be Created and What Resources are Needed?***

**7:00-8:30 PM Cocktails and Dinner**

**\* George Fenton's presentation was delivered by Rolando Tomasini with support provided by Agnes Nyaguthie. Mr. Fenton was called to assist in emergency disaster relief in Burma/Myanmar due to Cyclone Nargis.**

**\*\* Jose M. Cruz's presentation is available online with the other conference presentations at: <http://hlogistics.som.umass.edu/>**

**Jose M. Cruz could not attend the conference due to visa problems. The schedule was shifted accordingly to allow for more discussions.**

**Friday, May 9, 2008**

**Informal Breakfast**

Conferees are required to vacate the Center by 10 AM. The Bellagio Center provides two shuttles back to Milan.

***Funding for this conference beyond that of the Rockefeller Foundation was provided by:***

***The John F. Smith Memorial Fund of the University of Massachusetts at Amherst; <http://www.umass.edu>,***

***The Virtual Center for Supernetworks; <http://supernet.som.umass.edu> at the Isenberg School of Management; <http://www.isenberg.umass.edu>, Anna Nagurney - Director, <http://people.umass.edu/nagurney/>***

***The Institute of International Education (IIE); <http://www.iie.org/>.***

***This support is gratefully acknowledged.***

***Special thanks go to Ms. Pilar Palacia, the Managing Director of the Bellagio Center, for her graciousness, warmth, and assistance, both before and throughout the conference, and to Ms. Laura Podio, the Frati Meetings Coordinator of the Bellagio Center, for her expert and tremendous help with the logistics of the conference itself. Generous thanks are also extended to all the staff members of the Bellagio Center for their hospitality.***

**Notes on the *Humanitarian Logistics: Networks for Africa***  
**Conference Compiled by Dr. Charles Mbohwa**  
**and Dr. Anna Nagurney**

Ms. Agnes Nyaguthie of Oxfam-GB in Pretoria, South Africa delivered the presentation, *The Important Role Humanitarian Logistics*. OXFAM-GB operates in 50 countries attending to malaria, cholera, public health, food distribution, and poverty. The humanitarian assistance providers are faced with language challenges in their operations, with a variety of languages from the indigenous to French, Portuguese, and English in Southern Africa. Activities and economies in the countries are corporate-driven. Some of the interventions are meant to save lives. Oxfam-GB engages in advocacy, collaboration with partners, and shares warehouses, security, and partners, when appropriate, and feasible, with governments. Experiences show that women when targeted perform better in humanitarian activities. The organization is involved in a verification process to improve accountability and transparency.

***Notable quotes by Ms. Nuaguthie:***

"Logistics is about saving lives - giving society what it needs."

"A lot of organizations have not invested in logistics - it needs to be more of a strategic function."

"We need to get the right people into the profession."

"We work through women and the cultural practices within the society."

"If you educate one African, you educate all of Africa."

Dr. Cosmas Zavazava of the International Telecommunications Union (ITU) of the United Nations presented the talk, *Bridging the Last Mile Gap through Telecommunications/ICT in Disaster Management*. His presentation emphasized the need for preparedness and the mapping of countries, using GIS technologies, to assist in assessing disaster impacts after floods, volcanic eruptions, earthquakes, or droughts. ITU has memorandums of understanding with many countries and allocates frequencies for humanitarian operations. They can set up satellite telephone call centers available free of charge to the affected people and relief agencies. There is a project of \$55 billion to enhance connectivity in Africa including broadband connections and financing is not an issue for some of the projects since they have trust funds, seed money, and a robust ITU budget. Partnerships with NGOs are sought and effective co-ordination is required. The problem is that all organizations see the need for co-ordination, but none want to be co-ordinated.

***Notable quotes by Dr. Zavazava:***

"It is important to spend time in disaster preparedness."

**"There is a need to incorporate resiliency and redundancy in the networks and to understand network vulnerability."**

**"There is a huge digital divide in Africa - in regions where many disasters occur there is no phone communication for miles."**

**"Regions of greatest vulnerability, such as Zambia, have the worst communication penetrability." "Zambia, for example, is pathetic in terms of connectivity."**

**"Coordination is so important and building platforms for private/public partnerships."**

**"People with special needs - the blind, women, and children, must be listened to." "As one man said to me, 'I may not have eyesight, but I have vision.'"**

**"We must include everyone on the journey."**

**Dr. Charles Mbohwa presented the paper, *Identifying Challenges and Collaboration Areas in Humanitarian Logistics: A Southern African Perspective*. The paper focused on illuminating mini-cases on humanitarian logistics that discussed particular issues in Zimbabwe. Some particular challenges that were identified included: the value of money can change quickly; there is a serious lack of maintenance of infrastructure; lawlessness may prevail, seriously hampering logistical operations in times of humanitarian crises. Oftentimes, there is a mismatch between donated goods and what is actually needed, The demand is swelling from beneficiaries. How does one train volunteers so that they are effective? How can one deal with the immense challenges of political instability, diversion of goods and supplies, and harrassment of workers?**

**Notable quotes by Dr. Mbohwa:**

**"In disasters, one must look at site challenges - often there is a very difficult terrain and environment. It is 'business as unusual.'"**

**"There is a need for performance indicators." How do you design 'adaptable,' structures and manage the divergence of supplies?"**

**"What is the role of humanitarian organizations in infrastructure development and maintenance -- what about new roads; existing roads?"**

**"The military/humanitarian interface must be better managed."**

**"There is a need for flexible networks that can respond to challenges as was done after the Kobe earthquake in Japan."**

**Dr. Anna Nagurney gave the presentation, *Supply Chain Network Models for Humanitarian Logistics: Identifying Synergies and Vulnerabilities*. A principal idea of the presentation was how to develop appropriate measures to attend to synergies and vulnerabilities. In 2006, 157 million people needed humanitarian assistance and 50% of the budget was spent on transport, storage, and administration costs. The presentation included a comprehensive list of humanitarian logistics publications. She presented a network model to quantify the impacts of linkages between two organizations to minimize the generalized total cost and to maximize the effectiveness, given constraints. The framework may be used to assist in the understanding of the impact of merging and sharing resources of two humanitarian organizations during disaster relief. Dr. Nagurney considered supply-side uncertainty and demand uncertainty issues and factors. The work, which is joint with two of her doctoral students, quantifies teaming/merging/integration advantages associated with humanitarian logistical operations in the form of supply chain networks.**

***Notable quote by Dr. Nagurney:***

**"Thank you all for being part of this conference. It has been a transformative experience."**

**Mr. Rolando Tomasini spoke on, *Private Sector Engagement in the Humanitarian Sector*. He is affiliated with the Humanitarian Research Group at INSEAD in France as its Program Manager. A Social Innovation Center has been created there. Part of the group works on environmental and sustainable operations and the African Initiative. Presence of the group and activities include those in Singapore, Abu Dhabi, India, and Israel. At INSEAD there are 143 faculty and staff from 31 countries, 880 MBAs, 56 Executive MBAs, links to 7000 Executives, 64 PhD and 17 Centers of Excellence. Professor Luk Van Wassenhove leads the group. An accountability and de-politicization of humanitarian activities journal paper has been published. Presentation also discussed the overcoming of learning obstacles for best practices. Differences between planning, MOU terms, intentions, and actual implementation when a disaster strikes were described. Mr. Tomasini also defined issues and views for humanitarian organization partnerships with the private sector. His co-authored book *Humanitarian Logistics* will be coming out soon. He also emphasized the importance of case studies.**

***Notable quotes by Mr. Tomasini:***

**"Demand-based supply chains are what is needed, rather than supply-based ones."**

**"The system of accountability in San Salvador after the earthquake demonstrated the depoliticization of the humanitarian supply chain."**

**"Adaptability and agility are essential to humanitarian supply chains."**

**"The media coverage influences donations but will you be there after the crisis?"**

**Dr. Anton Kleywegt of the School of Industrial and Systems Engineering at Georgia Tech in Atlanta, gave the presentation, *Dynamics and Longer Term Consequences of Humanitarian Logistics Relief*. The presentation, which was based on several papers, included a model of the effects of disaster-based donations on real estate and on local economies. A *NYTimes* article was highlighted in which CARE was to turn down US federal donations of food. Dr. Kleywegt discussed the impact of food donations on regional excess food producers. Cost-benefit determines real estate projects. Risk cost and insurance cost were reduced by federal government subsidies. Develop land when value is greater than expected total cost. It is important to factor in government aid distortions. He gave the definition of social surplus as the net benefit. Previous non-viable land becomes viable through aid subsidy. Increase in disaster aid becomes needed due to development in disaster areas. He also defined consumer surplus and demand surplus in the economy. Social surplus is the sum of the two. Donations may distort markets and destroy the local production volumes and capacity. A cobweb model was designed to identify the equilibrium price, which may diverge and spiral away from the equilibrium. Analysis was done for no donations, immediate donations (much more unstable), and optimal control of donations (more stable). The economy may be better off with no donations. When donor fatigue sets in prices go up very high and shortages recur. One should be aware of donor dependency syndrome and the impact of donations on regional economies.**

***Notable quote by Dr. Kleywegt:***

**"Expectations of disaster aid may lead to increases in needed disaster aid."**

**Dr. Gyongi Kovacs is the Co-ordinator of the HUMLOG Group, a Research Network on Humanitarian Logistics Transformation, consisting of Group Finland, Norway, Sweden, UK, Ghana, the UNJLC, and the Kwame Nkrumah University of Science and Technology. She gave a presentation on the activities of the HUMLOG group. The focus is on funding, coordination, third party logistics, needs assessment, measurement, organizational learning (volunteers and short term employees), gender issues, defense studies with universities, health care supply chains, and challenges. A case study of Swedish Defense Forces operations in Liberia was discussed. The group organizes workshops, seminars, and conferences for practitioners, and academics, as well as dedicated conferences. She discussed experiences in Ghana and noted similarities to China. Dr. Kovacs noted that courses/programs in humanitarian logistics need to include field experience and academic work.**

***Notable quotes by Dr. Kovacs:***

**"Man-induced disasters are disasters in coming -- soil erosion is a huge problem in Ghana."**

**"Some logisticians may be able to work better in China because of less media exposure."**

**"There is a lack of trained logisticians."**

**Emmett J. Lodree of Auburn University in Alabama, delivered the presentation, *Inventory Planning for Hurricane Events*. He shared his family's personal experiences with Katrina. He emphasized the need for more first responders that are well-equipped and supplied. He pointed out the big role of the Coast Guard in Hurricane Katrina. Movement of very old people was not properly taken into account after Katrina. Evacuations "for nothing" previously encouraged people not to panic as they had been too costly "for nothing." He discussed the roles of the public and the private sectors in logistics and that of the Federal Emergency Management Agency (FEMA) Logistics Directorate. There are risks of being over or under prepared. He described a model for response to hurricanes using historical data, hurricane prediction models, giving sufficient reaction time and the fact that a hurricane can be predicted with more accuracy as time goes on. 3 to 5 day forecasts may be available for the eye of the storm. What is the wind speed probability. It is important to consider forecast accuracy versus time. When it is more certain, however, it is harder to conduct the evacuations and to change the inventory level of supplies. His presentation utilized empirical data based on 143 hurricanes from 1995 to 2004 with 23 hurricanes being classified as extreme. Dr. Lodree's research was able to identify what time to make the decision and what level the stocking quantities should be of the supply. He is using a National Hurricane Center prediction model as an extension. It will account for wind speed and the location of the hurricane eye as well. The research article is in press. More attributes of the hurricane can be considered, multiple demands and multiple orders/production, as well as random observations of the storm's evolution.**

***Notable quotes by Dr. Lodree:***

**"My mother's house was destroyed in Hurricane Katrina."**

**"There are risks associated with overpreparedness vs. underpreparedness."**

**"What should the inventory level (of necessary supplies) be?"**

**Paul Thompson of Northrop Grumman IT gave the presentation, *Supply Chain Analytics for Humanitarian Logistics Transformation*. \$14.4 billion in 2006 in terms of humanitarian assistance. Africans produce 83% of what they eat. Transportation of US food accounts for 65% of the cost. Local procurement saves 50%, 10% of aid is cash and aid system benefits business interests. 10 to 25% of operating costs can be saved in the supply chain. What do you measure? Follow-up after disasters for many years after. What are the bio-fuel impacts? Definition of disaster based on death rates and set thresholds. Military definition of logistics tends to cover all operations. This differs from the commercial chain. Context adaptability is critical to humanitarian logistics. One needs to: maximize efficiency, flow, distribution efficiencies, and reverse efficiency. Incineration of unused supplies can be harmful to the environment. One needs to get measurable results to have informed decisions. The creation and application of decision-making tools and models is needed in all phases through life cycle. Effectiveness in relief logistics is crucial. Culture and economic differences,**

as well as self-interest, need to be recognized and acknowledged. How do you decide who gets what? Dignity, equity, and need are important. There may be teaming and gaming aspects. Who got there first to a disaster area, is growing your humanitarian organization important, what is the market share etc? There is a need to differentiate between self-serving and altruistic measures like lives saved. Consider cost indicators, ability to advocate as performance measures for an organization, and accountability. Humanitarian Enterprise Logistics Planning software stylized for the complete humanitarian logistics supply chain. Optimization model was presented that minimizes cost and loss. Data items set and variables set and applied in the software model. Sensitivity analysis for cost/capability trade-offs were conducted and discussed. Can use supply chain analytics in planning (important use of models) and in delivery (current, historical, and may use models). Analytics may also be useful for fund-raising, teaming and partnership, and can result in cost savings. Can also develop modes in phases and re-optimize, resulting in multi-stage modeling.

Notable quotes by Dr. Thompson:

"Part of the world is dying; part of the world is yawning and making profits."

Dr. Thompson shared a quote from Adam Smith's book, *Wealth of Nations*, "Humanitarian assistance saves lives."

"Unequal distribution of wealth is the cause of pverty."

"There is essentially no research on returns of supplies in humanitarian supply chains. There is incineration in many cases in Africa."

Mr. George Fenton, of World Vision International, was called to assist in relief operations following Cyclone Nargis in Myanmar/Burma. His presentation was given by Mr. Rolando Tomasini and was entitled, *Partnering for Relief, Optimizing Logistics and Quantitative Methods*. Africa is the largest recipient of aid. Information on top 20 emergency relief agencies world-wide is \$600 million per year. Network of many parties involved in emergency response. Look at various aspects like internally displaced people (IDPs) and others. Federation and Committed of the Red Cross etc., split between public and private. Inter-agency working group in Nairobi for collaboration. Cluster system in UN system by under-secretary general for humanitarian assistance. Network aims to maximize each sector's expertise. Pre-positioning of relief supplies improves response times to less than 48 hours and improves cost efficiency. Presented an organizational structure, MOUs, governance issues, customs clearances easier for UN agencies so do it for others. Impact of networks on relationships with the donor and related contractual obligations is a challenge. There exist issues of governance in decision-making, procurement, cost allocation, operations and activation.

**Mr. Antony K. Cooper of CSIR in Pretoria, South Africa, presented, *Some Thoughts on Humanitarian Logistics and Quantitative Methods*. CSIR was established 1945. It is similar to CSIRO in Australia, which was established later. More than 60% of work is funded by contracts, royalties etc. Information dissemination and accuracy of the number of people in need of relief are essential. 11% of the people of New Orleans when Hurricane Katrina hit were diabetic. Medical emergencies were not sufficiently considered. In certain parts of the world, AIDS orphans cannot be treated due to not having IDs and they have no way of getting them. There are millions of people without IDs in China, India, and in many slums all over the world. In the case of Katrina, 10,000 insulin doses were impounded since they were not refrigerated even though they could last a month at room temperature. Ensuring that prediction and preventative systems work and that early warning information gets to target people are all critical. There is need for automated SMS delivery to subscribed people for early warning. GIS use in humanitarian logistics can be extremely helpful and useful. Location-based services are crucial to identify traffic jams, the re-routing, and track movement of people during and post disasters. One must also consider cultural mismatches. It is essential to create portable and easy to implement logistics systems. In practice, information flows based on panic reaction may result in the implementation of incorrect measures. One should focus on providing information to the affected people, one self-help, and on what to do. Such information can also be part of emergency preparedness. There is a need for the creation of traffic information systems where they do not exist. One should avoid packing too many things into scales, indices, and indicators in order to avoid confusion and competing measures. For example, good measures include: the FAO integrated food security and humanitarian phase classification (IPC), the Northeast snowfall impact scale, the hurricane scale on storm intensity etc. Automated warning systems send warnings via SMSs, TV, and/or sirens.**

***Notable quotes by Mr. Cooper:***

**"Can appropriate documentation be stockpiled before disaster strikes?"**

**" It is important to better date Google maps and GIS information -- a higher resolution "after" Katrina that was posted was actually taken before."**

**"One must consider the logistics of information flow."**

**"Can we make a vulnerability map of social disasters?"**

**"Educate the public about the kind of response they can expect."**

**"We need to develop real-time scales for disasters."**

**Dr. Panos M. Pardalos of the University of Florida in Gainesville, presented, *Detecting Critical Nodes in Sparse Graphs*. He described a procedure by which one can identify the set of critical nodes whose deletion results in maximum pair-wise disconnectivity with applications that include telecommunication networks and supply chains. The methodology is also**

applicable to jamming networks while looking at nodes that maximize disruptions; covert/terrorist network disruptions to target critical network individuals; controlling social contagions- viruses, vaccinations, target sets to reduce spread; drug design; emergency response- roadways to attack or prevent enemy travel, mass evacuation, and the fortification, repair, and recovery from natural disaster One may need to use heuristics for more complicated problems as an optimization problem using state of the art packages. Can combine constraints and use heuristics to simplify and attempt a solution. The challenge is to verify the solution more than finding the solution. Protection of critical infrastructure and business survival. The modeling is more complex for directed networks.

*Notable quotes by Dr. Pardalos:*

"When I was a child in Greece, after a disaster we had "sacks" delivered for relief but they were empty."

"Science has value to society."

Dr. Berc Rustem of the Department of Computing at Imperial College in London, England delivered the talk, *Decision Making Under Uncertainty Worst-case Analysis & Expected Value Optimization*. Uncertainties are those with no unknowns, no knowns, and no unknown unknowns. Complicated solutions to complicated problems. Worst- case analysis and expected value optimization was addressed. There is no substitute to wisdom in using models and solutions. Robustness of models was also considered in the presentation. Multiple maxima scenarios considered to ensure coping with the worst case scenarios. The goal may be to maximize performance and to minimize expected risk. The Bank of England uses stochastic programming to forecast inflation and GDP for future scenarios. Can use a scenario tree to use discrete probabilistic models and models in such humanitarian logistics applications as project management, task assignment, and routing.

*Notable quotes by Dr. Rustem:*

"There is no substitute for wisdom."

"Worst-case analysis is a way of dealing with uncertainty."

## **Invited Presentation Titles and Abstracts**

<http://hlogistics.som.umass.edu/>

**Antony K. Cooper, CSIR, Pretoria, South Africa**

### ***Some Thoughts on Humanitarian Logistics and Quantitative Methods***

**This presentation will discuss a few issues concerning humanitarian logistics and quantitative methods, including:**

- (1) Identifying people in a disaster to give accurate figures of casualties and to determine how many people still be missing, to target search and rescue operations properly. This need for information on people needs to be balanced with issues concerning invasion of privacy and governments using the information against their citizens that they consider to be hostile.**
- (2) Facilitating the movement of humanitarian workers\* and aid, while not at the same time facilitating the movement of criminals and contraband.**
- (3) Producing 'before' and 'after' pictures of disaster areas (eg: using remote sensing), to determine what has happened and the extent of the damage.**
- (4) Predicting or preventing disasters – could we develop models for predicting 'social' disasters (war, civil unrest, famine, epidemics, building fires, hostage taking, etc) so that interventions can be made?**
- (5) Geographical information systems (GIS) to support humanitarian logistics and for planning and managing programmes such as de-mining.**
- (6) Inappropriate donations – preventing them, redirecting them to where they could be used or the reverse logistics problem, to return the donation to its sender.**
- (7) Preventing looting and pilfering.**
- (8) Deployable logistics systems – portable generic logistics systems that can be deployed into disaster areas and set up quickly, using platforms such as One Laptop Per Child (OLPC).**
- (9) Panic seems to be the norm with disasters, even slow moving ones. Panic is probably driven by the lack of accurate and credible information – the logistics of information flow.**
- (10) Developing a scale or index (or a set of them) for the severity of a disaster, to tailor responses appropriately, determine the level of the authority responsible for managing the disaster, or to allocate resources between 'competing' disasters.**
- (11) Indicators for refugee situations, to assess how well it is being managed – health, access to water and food, schooling disruption, etc.**

**Jose M. Cruz, University of Connecticut, Storrs, USA**

***Corporate Social Responsibility for Sustainable Development in Africa***

A number of core development issues in Africa are already central to the corporate social responsibility (CSR) agenda. They include labor standards, human rights, education, health, child labor, poverty reduction, conflict and environmental impacts.

In this presentation, I analyze how corporate social responsibility can help deliver sustainable development in Africa.

***George Fenton, World Vision International, Nairobi, Kenya***

***Partnering for Relief - Optimizing Logistics: An Inter-Agency Approach: Why and How?***

**Anton Kleywegt, Georgia Institute of Technology, Atlanta, USA**

***Dynamics and Longer Term Consequences of Humanitarian Relief***

Humanitarian relief can have consequences for the economy of the region receiving the relief. For example, donations of goods can affect the prices of related goods and services in the local market, and thereby affect the economic activity of local suppliers of the related goods and services. Also, humanitarian relief can affect the expectations of economic agents, and thereby affect their decisions. These concerns have been raised in the past, and recently it led to some NGOs taking action to reduce some adverse economic consequences. We study some dynamic models that illustrate some of the economic consequences of humanitarian relief.

**Gyongyi Kovacs, Swedish School of Economics and  
Business Administration, Helsinki, Finland**

***The HUMLOG Group -- A Research Network on  
Humanitarian Logistics***

HUMLOG is an international research network on humanitarian logistics. The aim of the HUMLOG Group is to research the area of humanitarian logistics in disaster preparedness, response and recovery with the intention of influencing future activities in a way that will provide measurable benefits to persons requiring assistance.

The group consists of several universities and research institutes in the Nordic countries and beyond. Apart from researchers, UNJLC as a founding member of the group has a seat in its co-ordination meetings.

Since its establishment in Dec 2006, the HUMLOG Group has conducted a number of different research projects together with different humanitarian organisations. The current research focus of the group is on the areas of funding, co-ordination, assessment, and measurement, i.e. on (a) the logistical implications of funding schemes, (b) the co-ordination of humanitarian activities across humanitarian organisations and in humanitarian supply chains, (c) needs assessment, and (d) performance measurement in humanitarian logistics.

A recent study of the HUMLOG Group is on the challenges of humanitarian logistics in Africa, particularly focusing on Ghana.

**Emmett J. Lodree, Jr., Auburn University, Alabama, USA**

***Inventory Planning for Hurricane Events***

Many government agencies, not-for-profit organizations, and private corporations assume leading roles in positioning supplies, equipment, and personnel to support initial response operations after a major hurricane. These organizations are faced with challenging supply chain and logistics decisions to ensure that supplies, equipment, and personnel are readily available at the right places, at the right times, and in the right quantities. This presentation introduces stochastic models that will assist emergency-, logistics-, and production-managers; military leaders; and government officials in managing the uncertainties associated with developing quick response and cost effective disaster relief plans for responding to major hurricanes.

**Charles Mbohwa, University of Johannesburg, South Africa**

***Identifying Challenges and Collaboration Areas in Humanitarian Logistics: A Southern African Perspective***

This paper discusses the challenges, difficulties and problems faced by humanitarian organisations in running logistics systems in Southern Africa, with a focus on issues in Zimbabwe in particular. Mini-case studies of the operations of the World Food Programme, the International Red Cross Society and the Zimbabwe Red Cross Society, the World Health Organisation, the United Nations Children's Fund and the Zimbabwean Civil Protection Organisation are discussed. These clarify the challenges faced as the lack of trained logistics personnel, lack of access to specialised humanitarian logistics courses and research information, the difficulty in using and adapting existing logistics systems in attending to humanitarian logistics and the lack of collaborative efforts that address the area specifically. Though the focus is on operations in Zimbabwe and operations

that include Zimbabwe and neighbouring countries, the work can benefit other regions in Africa and beyond. The finding aim to inform decision making and activities on collaborative networks that are beneficial to humanitarian logistics.

**Anna Nagurney, University of Massachusetts at Amherst, USA**

***Supply Chain Network Models for Humanitarian Logistics:  
Identifying Synergies and Vulnerabilities***

This paper describes how supply chain network models can be utilized to assist in humanitarian logistics. We discuss issues such as congestion, multicriteria decision-making, as well as the optimization of the delivery of multiple products subject to capacities in the storage and distribution facilities and on the transportation links. We describe relevant performance metrics and how to identify possible synergies through supply chain integration. We also discuss appropriate measures for vulnerability analysis.

*This is joint work with Trisha Woolley and Qiang "Patrick" Qiang.*

**Agnes Nyaguthie, Oxfam-GB, Pretoria, South Africa**

***The Important Role of Humanitarian Logistics***

As Africa continues to struggle to achieve the MDG, complex emergencies continue to emerge. Interventions continue to grow on a large scale as are the budgets and the donors and public are demanding increased operational and fiscal efficiency. This state of affairs places Logistics and Supply Chain Management, which is a core function in the successful delivery of Humanitarian Relief, at a very strategic level; hence, demanding a more sophisticated level of supply chain management practice and competence. Humanitarian organizations now more than ever must deliberately focus on developing logistics to be able to fully support the implementation of these goals.

**Panos M. Pardalos, University of Florida, Gainesville, USA**

***Detecting Critical Nodes in Sparse Graphs***

Identifying critical nodes in a graph is important to understand the structural characteristics and the connectivity properties of the network. In this talk, we focus on detecting critical nodes, or nodes whose deletion results in the minimum pair-wise connectivity among the remaining nodes. This problem, known as the Critical Node Problem, has applications in several fields including supply chains, telecommunications, and military strategic planning. We show that the recognition version of the problem is NP-complete and derive a mathematical formulation based on integer linear programming. In addition, we propose a heuristic for the problem which

exploits the combinatorial structure of the graph. The heuristic is then enhanced by the application of a local improvement method. A computational study is presented in which we apply the integer programming formulation and the heuristic to real and randomly generated data sets. For all instances tested, the heuristic is able to efficiently provide optimal solutions in a fraction of the time required by a commercial software package.

*This is joint work with Ashwin Arulsevan, Clayton W. Commander, and Lily Elefteriadou.*

**Berc Rustem, Imperial College, London, UK**

***Decision Making under Uncertainty Worst-case Analysis  
& Expected Value Optimization***

Uncertainty is a central concern in optimal decision making. There are different model-based approaches to address the problem involving stochastic or worst-case robust characterizations. These can be seen as complementary and can be used to gain deeper insight, assist analysis and provide decision support. We discuss generic computational models of optimization, decision policy and design under uncertainty and applications to macroeconomic policy, finance, defense, engineering and project scheduling.

**Paul Thompson, Northrup Grumman IT, McLean, Virginia, USA**

***Supply Chain Analytics for Humanitarian Logistics Transformation***

Supply Chain Analytics plays a critical role in Humanitarian Logistics Transformation. It generates the information that decision makers need to reduce costs, improve performance and responsiveness, and increase flexibility. Supply Chain Analytics methods range from simulation of proposed logistics processes to building algorithms that optimize procurement, storage, distribution and coordination. In this talk, we present examples where Supply Chain Analytics has led to improvements in logistics performance, and discuss transformational opportunities for humanitarian logistics networks for Africa.

**Rolando Tomasini, INSEAD, Fontainebleau, France**

***Private Sector Engagement in the Humanitarian Sector***

In this talk I will give a review of best practices for collaboration during and between disasters. I will emphasize how to create social and economic value through the transfer of best practice.

**Cosmas L. Zavazava, International Telecommunications Union,  
Geneva, Switzerland**

***Title: Bridging the Last Mile Gap through Telecommunications/ICT in  
Disaster Management***

**This presentation looks at the critical role of telecommunications / information and communication technologies in disaster management for both disaster victims in distress and people involved in humanitarian work especially those defined as 'first responders' (including humanitarian logisticians). It covers three main phases of disaster management i.e. disaster preparedness, disaster relief, and telecommunications network rehabilitation. Technology, Regulation and Policy are the three key elements that run through the presentation. The over 140 years work of the International Telecommunication Union in setting telecommunication standards, spectrum management, and development as well as deployment of telecommunications/ICT applications/services will be highlighted in this presentation with a special emphasis given to those aspects that directly relate to disaster management to include humanitarian logistics. The presentation will seek to demonstrate how the work of logisticians' work could be facilitated by telecommunications as they collect, analyze and disseminate logistics information relevant to threatening disasters, and ongoing humanitarian operations. Reliable telecommunication networks facilitate the scheduling and movement of humanitarian cargo and relief workers to, and within the crisis area.**

***Special Acknowledgments:***

***Anna Nagurney thanks all the invited speakers for their outstanding contributions in terms of the presentations and discussions.***