

Technology to Improve Logistics Decisions

Jarrold Goentzel

MIT Supply Chain Management Program



GEORGIA TECH
Health & Humanitarian Logistics Center
A Unit of the Supply Chain & Logistics Institute

Georgia Tech **ISyE**
H. Milton Stewart School of
Industrial and Systems Engineering



Panel: Technology to Improve Logistics Decisions

3 March 2011

Conference on Health and Humanitarian Logistics

Georgia Tech

Jarrood Goentzel

Executive Director, MIT Supply Chain Management Program

Research Director, MIT Humanitarian Logistics Initiative

Example: Technology in Crisis

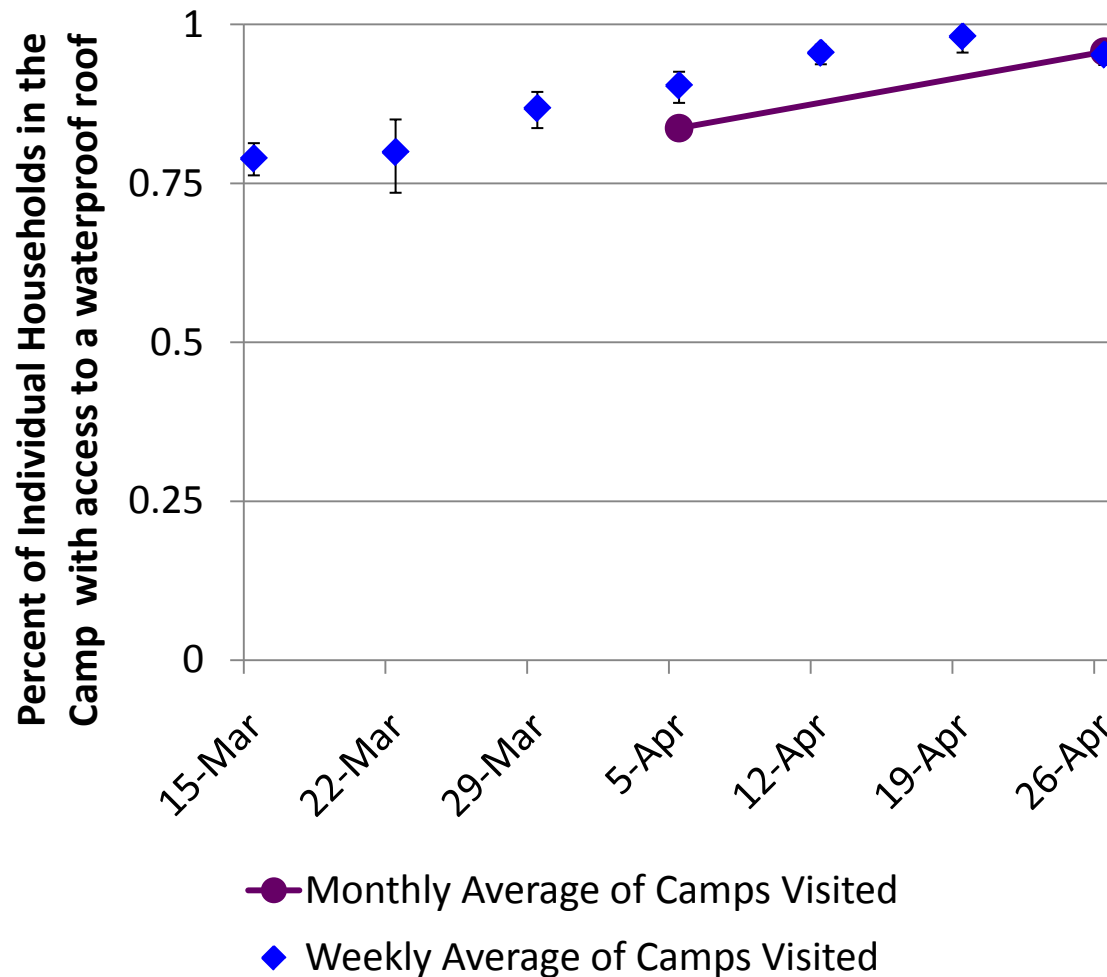
- Purpose: Needs assessment data collection as a demand signal for supply chains
- Technology: PDA survey uploaded daily
- Implementation
 - Questionnaire developed in collaboration with Clusters
 - 12 teams with 3 Haitian surveyors per team
 - Training and pilot before active collection
 - 288 site visits each 4 week period (6 days/wk)
 - At each site, survey 18-21 Households (randomly), Key Informant, and Health Center
 - 61 household questions
 - 40 key informant questions
 - 18 health center questions
 - Sites selected purposively
 - Camps in earthquake-affected areas
 - Communities near camps
 - Outlying areas in which IDPs have settled



PaP Weekly Snapshots: Shelter

Indicator: Access to Waterproof Roof

As presented
in May



Shelter situation has improved since March

Source:

Ms Amanda Schiff, Ms Erica Gralla
Dr Douglas Jones, Dr James Evans,
Dr Marc Zissman
(MIT Lincoln Laboratory)

Dr Louise Ivers
(Harvard Medical School, Partners In Health)

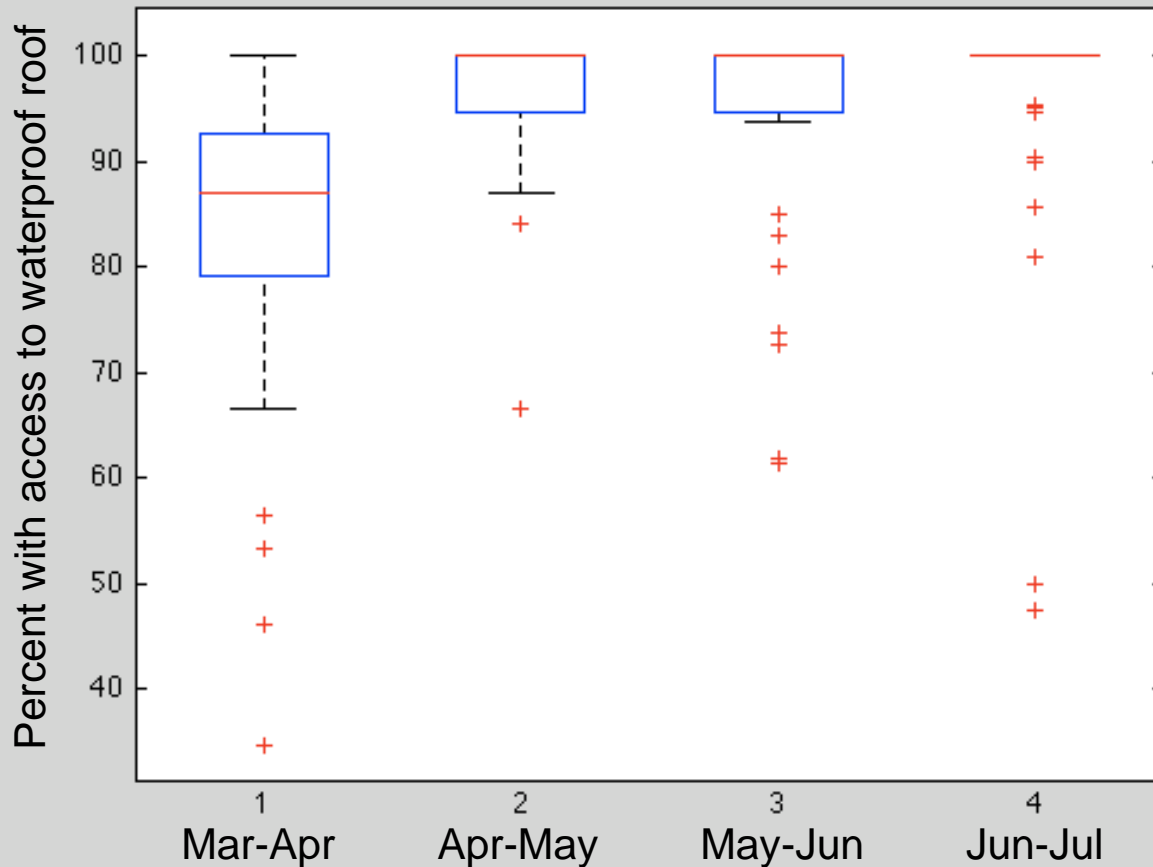
Briefing to the CSC

4 May 2010

PaP Monthly Snapshots: Shelter

Indicator: Access to Waterproof Roof

Updated
Analysis



Population:

sample mean of the
41 camps visited
each month

Descriptive Statistics:

- Median
- 25-75 percentiles
- Outliers

Source:

Ivers, L., Schiff, A., Goentzel, J.
and Gralla, E. "Analysis of Critical
Trends Following the 2010 Haiti
Earthquake." Working Paper.

Example: Technology in Crisis

- Purpose: Needs assessment data collection as a demand signal for supply chains
- Technology: PDA survey uploaded daily
- Impact
 - Raw data posted daily
 - Simple analysis for weekly briefing to sponsors
 - Deeper analysis of trends in hindsight
- Improvement
 - Plan for and automate data cleaning
 - Plan for and automate analytical process
 - Identify decision makers and create analytical “artifacts” for communication
 - Incorporate other assessments and data such as crowdsourcing to provide a comprehensive demand signal for supply chains



Example: Technology in Operations

- Purpose: improve warehouse space utilization
- Technology
 - Consumption data in Electronic Medical Records
 - Forecasting and simulation model in Excel

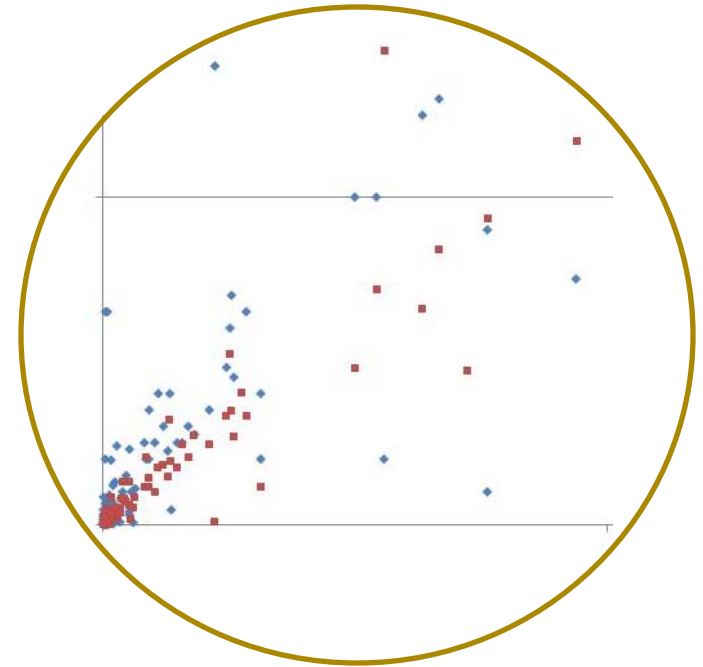
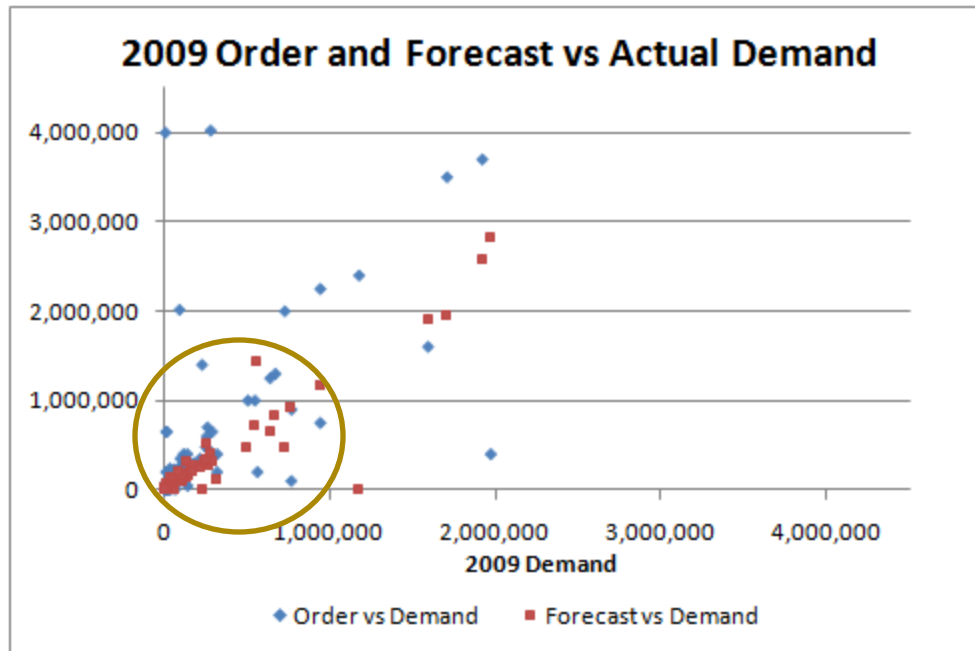
Forecasting/Simulation Model Snapshot

Cleaned Demand Forecasting Model with macros-05-07-10 - Microsoft Excel

N1		5/1/2007															
	A	B	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	type	product	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08
54	Injectable	Metronidazole500mgAmpulle	621	607	583	887	661	630	759	660	436	1086	720	652	665	851	88
55	Injectable	NaCl0.9%1000mlBottle	830	713	598	513	102	10	18	4	0	671	252	621	1019	866	114
56	Injectable	NaCl0.9%500mlBottle	143	146	426	683	898	889	1466	1223	1290	832	904	346	441	396	103
57	Injectable	Oxytocin10ui/mL10mlOther	487	474	535	607	516	354	442	638	910	992	478	602	741	583	81
58	Injectable	PenicillinBenzathine2.4MIUAmpulle	501	479	736	750	731	744	1068	735	753	1247	884	867	1144	1154	149
59	Injectable	PotassiumChlorideinj.10mlOther	205	194	165	195	139	115	136	83	73	161	208	204	333	309	17
60	Injectable	ProcainePNC3M3MIUAmpulle	126	115	72	83	93	128	189	40	72	216	66	182	287	126	23
61	Injectable	Promethazine50mg/mL2mlOther	135	45	147	80	82	29	54	74	88	139	33	103	137	86	15
62	Injectable	Quinine600mg/2mL600mlOther	157	118	86	17	83	78	65	60	35	59	60	43	71	13	6
63	Injectable	Ranitidine50mg50mgAmpulle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	Injectable	RingerLactate1000mlBottle	699	599	911	1224	1013	1159	1390	492	352	176	908	1094	1704	1678	209
65	Injectable	RingerLactate500mlBottle	700	482	616	719	539	760	755	1023	1283	1785	911	572	365	289	40
66	Injectable	Salbutamol0.5mg/1cc1mlAmpulle	104	86	94	94	134	193	219	101	88	186	116	76	56	29	3
67	Injectable	Tetanustoxoid1500mgAmpulle	395	371	460	154	67	96	104	152	87	135	106	136	194	87	28
68	Injectable	VitaminK1mgAmpulle	22	22	12	31	28	44	37	52	71	141	156	69	61	88	8
69	LabSupply	Alcohol70%1gallonBottle	47	36	41	47	32	31	34	70	52	74	32	20	33	39	14
70	LabSupply	Applicatormonte-notsterile1(item)Other	2150	945	1262	1451	888	2963	803	1083	457	1706	501	100	2005	1891	120
71	LabSupply	Applicatormonte-sterile1(item)Other	1443	1804	1700	630	1800	1100	2050	1612	1500	2432	1270	3316	3608	2288	236
72	LabSupply	Applicatormotmonte-notsterile1(item)Other	3194	3767	3304	1534	2462	2563	3492	3480	4617	452	5555	1432	3659	2668	300
73	LabSupply	Blade1(item)Other	8481	10017	9598	8688	4508	7444	9545	10457	9424	11947	9505	5533	7830	11020	782
74	LabSupply	Bloodtubepurple1(item)Other	9420	6303	6979	6695	5926	5412	9605	5798	6733	6150	4439	6576	9092	10156	758
75	LabSupply	Bloodtubered1(item)Other	9134	6979	9421	8503	6313	6375	9029	5649	5859	7145	4841	5794	8387	7682	905
76	LabSupply	Capillarytubes1(item)Other	5610	5304	4991	6079	6986	4651	6110	5849	9386	5564	4650	3449	8594	9353	1248
77	LabSupply	CD4control1(item)Bottle	25	25	100	0	0	0	0	75	0	0	0	0	100	125	0
78	LabSupply	CD4testreagents1(item)Other	253	140	232	300	200	450	325	200	150	150	225	50	550	750	65
79	LabSupply	DistilledwaterPPI1gallonBottle	52	40	33	16	23	17	21	32	38	29	19	28	33	30	3
80	LabSupply	EliteGlucometerglucoseteststrips1(item)Other	1191	520	533	996	761	851	791	553	720	849	280	455	417	215	33
81	LabSupply	EmptyTube1(item)Other	500	0	65	0	0	0	0	0	0	94	173	147	223	305	15
82	LabSupply	HIV1/2Capillusteststrip1(item)Other	342	341	267	620	433	208	315	424	312	615	216	325	400	711	61

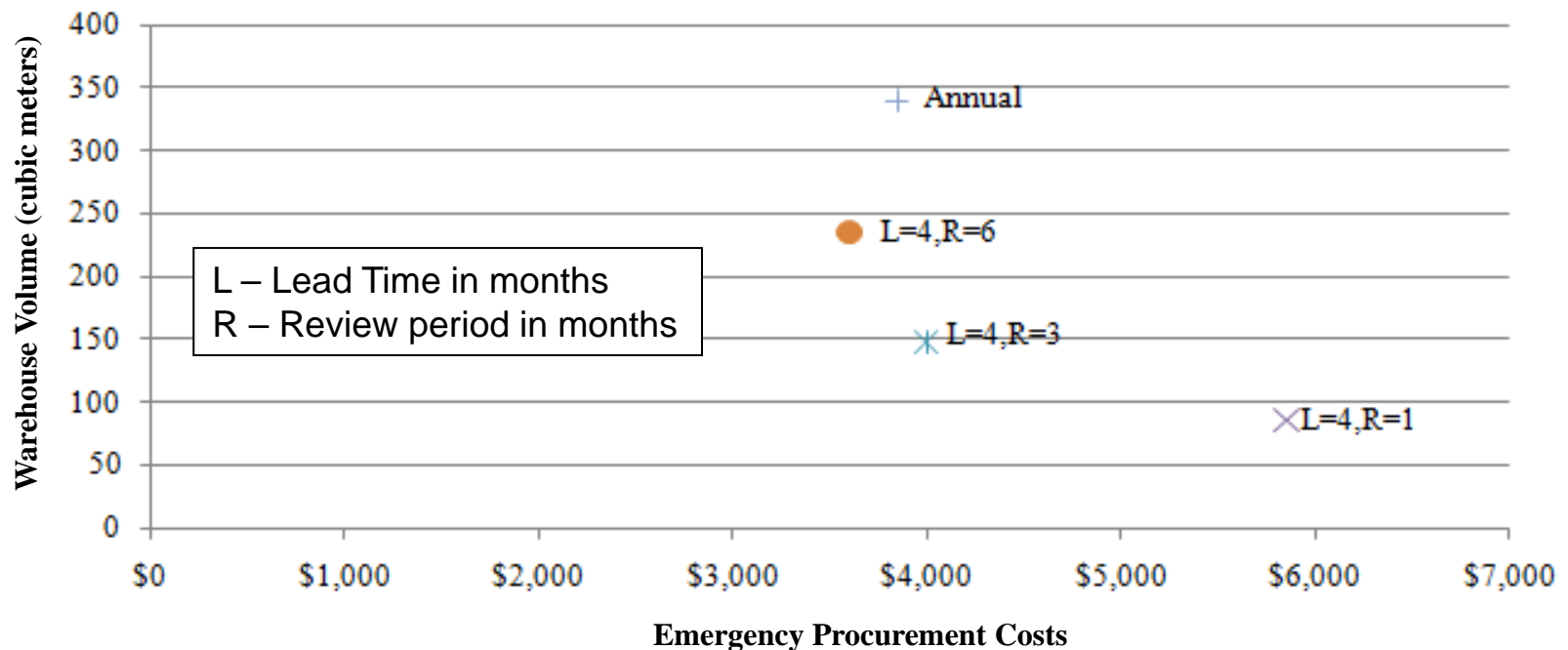
Product Details Monthly Data Clean Monthly Data ForecastModel ForecastOutput CleanForecastOutput Parameters Reorder Point Order up to Level Simulated Demand

Demand Forecasting Analysis



Order Policy Analysis

Results of simulation model



Technology to Improve Logistics Decisions: Where Next?

- Technology in crisis
 - *Focus: rapid demand signal and operating picture*
 - Leverage various data gathering technologies
 - Traditional: surveys, assessments, satellite imagery
 - New: crowdsourcing, sensors, mobile phone polling
 - Focus on technology that turns data into demand/supply information
 - Automation
 - Interpretation
 - Communication
- Technology in operations
 - *Focus: robust supply chain design and management*
 - Leverage various **development** paths
 - open source (e.g. OpenMRS, Helios Foundation, Sahana)
 - proprietary (e.g. AidMatrix, Llamasoft, Microsoft, SAP)
 - Move towards **interoperability**: standards (e.g. NetHope)
 - Plan and budget for **implementation**: process tools, customization/configuration, training, hosting architecture, offline synchronization
 - Select considering long-term **support**: commercial services, “Red Hat” for open source