

# Proto MT Evaluation for Humanitarian Assistance Disaster Response Scenarios

Doug Jones

Association for Machine Translation in the Americas

31 OCT 2016

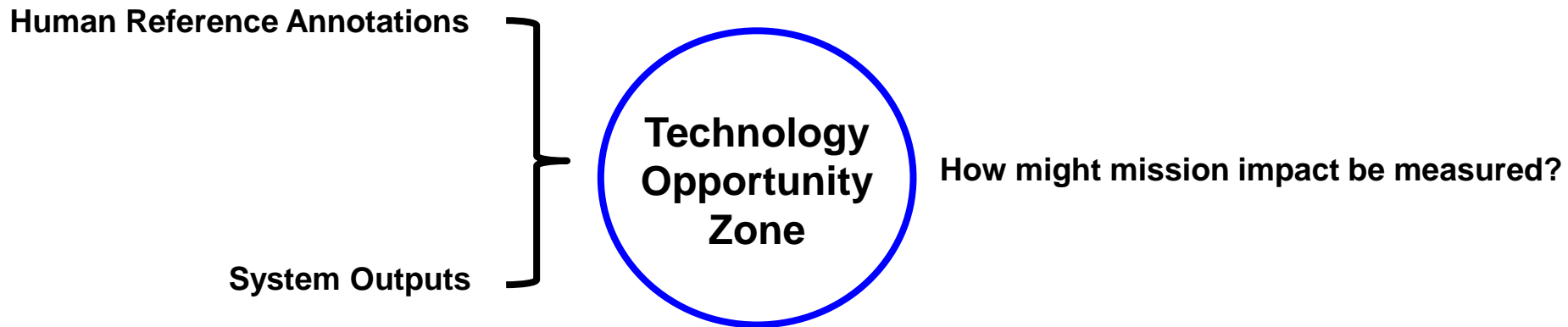


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# Concept of Experiment

(Last Slide)



## SPOILER ALERT

**MT may be neither necessary nor sufficient for HADR mission relevance**



# HADR

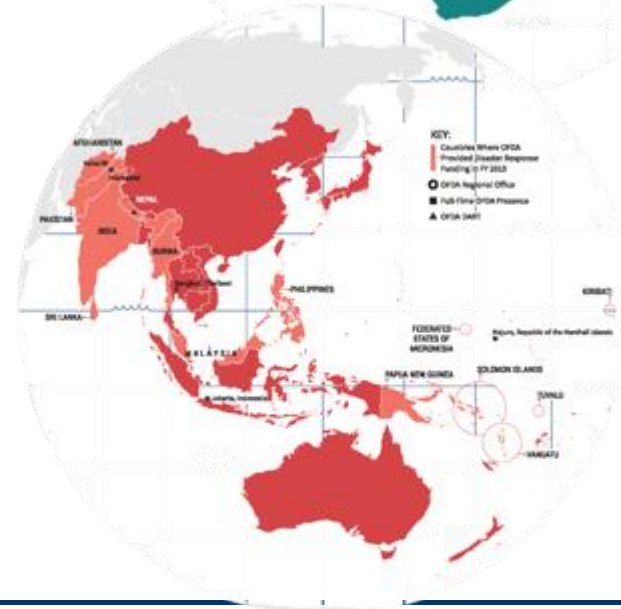
## Humanitarian Assistance Disaster Relief



Office of U.S. Foreign  
Disaster Assistance  
Annual Report



Office of U.S. Foreign  
Disaster Assistance  
Annual Report for Fiscal Year 2010





# Top 20 Languages of the World



## Legend and Source

- Size of circles indicates number of speakers based on Ethnologue data. Lewis, M. Paul, Gary F. Simons, and Charles D. Fennig (eds.). 2015. Ethnologue: Languages of the World, Eighteenth edition. Dallas, Texas: SIL International.



# Coverage of Seven Available MT Systems



## Legend and Source

- Size of circles indicates number of speakers based on Ethnologue data. Lewis, M. Paul, Gary F. Simons, and Charles D. Fennig (eds.). 2015. Ethnologue: Languages of the World, Eighteenth edition. Dallas, Texas: SIL International.



# ~7500 Languages

123 456 789 1011 1213 1415 1617 1819 2021 2223 2425 2627 2829 3031 3233 3435 3637 3839 4041 4243 4445 4647 4849 5051 5253 5455 5657 5859 6061 6263 6465 6667 6869 7071 7273 7475 7677 7879 8081 8283 8485 8687 8889 9091 9293 9495 9697 9899 10000  
 10001 10002 10003 10004 10005 10006 10007 10008 10009 10010 10011 10012 10013 10014 10015 10016 10017 10018 10019 10020 10021 10022 10023 10024 10025 10026 10027 10028 10029 10030 10031 10032 10033 10034 10035 10036 10037 10038 10039 10040 10041 10042 10043 10044 10045 10046 10047 10048 10049 10050 10051 10052 10053 10054 10055 10056 10057 10058 10059 10060 10061 10062 10063 10064 10065 10066 10067 10068 10069 10070 10071 10072 10073 10074 10075 10076 10077 10078 10079 10080 10081 10082 10083 10084 10085 10086 10087 10088 10089 10090 10091 10092 10093 10094 10095 10096 10097 10098 10099 10100  
 ... (The rest of the page contains a dense grid of numbers and characters, likely representing a large dataset or a specific encoding scheme.)



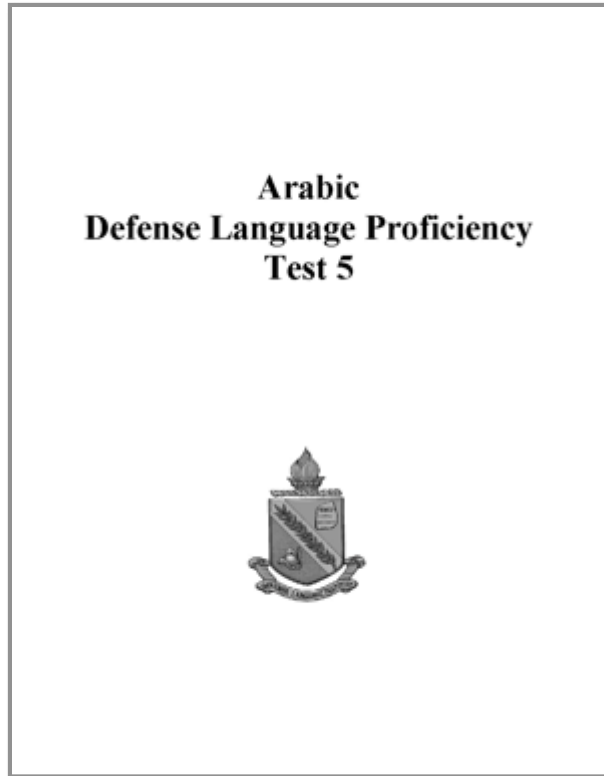
# ~7500 Languages – 1500 endangered ≈ 6500

101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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≈ 1% MT



# Use Standards and Doctrine



Performance Measures	GO	NO GO
1. Stopped the vehicle.	___	___
2. Informed the occupants of the reason for the search.	___	___
3. Identified the occupants by looking at their drivers' licenses or ID cards.	___	___
4. Directed the occupants to get out of the vehicle.	___	___
5. With the exception of the driver, directed the occupants to move to a place about 5 meters from the vehicle and out of the flow of traffic where they could be observed.	___	___
6. Directed the driver to open all doors and compartments, to include the ashtray, glove box and/or armrest, trunk, and hood.	___	___
7. Searched the vehicle in a sequenced manner.	___	___

STP 21-1-SMCT

18 June 2009

171-137-0001

3-199





# Flow of Information from Needs to Response

## Individual Needs

WE HELP US  
NEED FOOD



## Deliver Assistance



## General Mission

USAID/OFDA DoD Mission Tasking Matrix (MITaM)	
RESPONSE:	ETHAN Earthquake (EXERCISE ONLY)
	New Missions identified as of 1-Oct-11 at 1500 Local
Mission #	T-101
Priority	URGENT
WHO	WHO is Requesting US Military Assistance?
Name, Pos	Chivers, Dana
Org/Office	OFDA DART Civ-Mil Coordinator
email	dchivers@ofda.gov
phone	+1. 571.594-3937
WHAT	WHAT type of Service or Goods are Requested?
Describe as clearly as possible what you want the military to do.	Transport DART team on Aerial Recon of effected routes (Hwy1 & 2) to the south of the Capitol
WHEN	WHEN is it needed?
Date(s) & Time(s)	ASAP - request NLT 24 hours from now.
WHERE	WHERE is it needed? ...and HOW
If the request is for a static position:	
Site Name	N/A
Grid	N/A
POC on-site & contact info	N/A

## Aggregate Needs

Military Tasking





# Flow of Information from Needs to Response

## Individual Needs

WE HELP US  
NEED FOOD

Deliver Assistance



Actionable Information



## General Mission

USAID/OFDA DoD Mission Tasking Matrix (MITaM)	
RESPONSE:	LIHAN Earthquake (EXERCISE ONLY)
	New Missions identified as of 1-Oct-11 at 1500 Local
Mission #	T-101
Priority	URGENT
WHO	WHO is Requesting US Military Assistance?
Name, Pos	Chivers, Dana
Org/Office	OFDA DART Civ-Mil Coordinator
email	dchivers@ofda.gov
phone	+1.571.594-3937
WHAT	WHAT type of Service or Goods are Requested?
	Describe as clearly as possible what you want the military to do.
	Transport DART team on Aerial Recon of effected routes (Hwy1 & 2) to the south of the Capitol
WHEN	WHEN is it needed?
Date(s) & Time(s)	ASAP - request NLT 24 hours from now.
WHERE	WHERE is it needed? ...and HOW
	If the request is for a static position:
Site Name	N/A
Grid	N/A
POC on-site & contact info	N/A

Military Tasking



Aggregate Needs





# LORELEI HADR Topics

## Low Resource Languages for Emergent Incidents

### Emergency Indicators and Minimum Standards

#### Malnutrition Emergency Definitions

Global Acute Malnutrition (GAM) = Severe Acute Malnutrition (SAM) + Moderate Acute Malnutrition (MAM)

#### GAM for <5 age group

Z-Score <-2 MUAC <13.5 cm WFW/WFL <80%

#### SAM for <5 age group

Z-Score <-3 MUAC <11.0 cm WFW/WFL <70%

#### MAM for <5 age group

Z-Score >-3 and <-2 MUAC >11.0 and <13.5 cm WFW/WFL >70% and <80%

See section D of chapter III, Interpretation of Malnutrition Rates and Corresponding Actions, for malnutrition indicators.

#### Mortality Rate Emergency Indicators

**Crude Mortality Rate (CMR):** single most important indicator of serious stress in affected populations

**CMR = deaths/10,000/day: emergency phase**

- <1 = Under control
- >1 = Serious condition
- >2 = Out of control
- >4 = Major catastrophe

#### Mortality rate for <5 age group

- 1 = Normal in a developing country
- <2 = Emergency phase: under control
- >2 = Emergency phase: in serious trouble
- >3 = Emergency phase: out of control

#### Minimum Water Requirements

- Minimum maintenance = 15 lit
- Feeding centers = 30 lit
- Health centers and hospitals = 40-60 lit
- 1 tap stand/250 people not >100m from
- A large quantity of reasonably safe water of pure water

#### Minimum Food Requirements

Minimum maintenance = 2,100 Kcals/person/day

#### Minimum Shelter/Space

- Minimum shelter space = 3.5 m<sup>2</sup>/person
- Minimum total site area = 45 m<sup>2</sup>/person
- settled camps

#### Minimum Sanitation

- At least 1 toilet for every 20 persons
- Maximum of 1 minute walk from dwelling

### Field Operations Guide

For Disaster Assessment and Response



USAID

## Needs

- Water
- Food
- Shelter
- Medical
- Utilities, Energy, Sanitation
- Infrastructure Damage
- Search / Rescue
- Evacuation

## Obstacles

- Civil Unrest
- Extreme Violence
- Regime Change





# Mission Tasking Matrix (MITAM)

USAID/OFDA DoD Mission Tasking Matrix (MiTaM)		what CARGO needs to be moved?		Total Weight ( ) units	Total Volume ( ) units
<b>RESPONSE: TITAN Earthquake (EXERCISE ONLY)</b>		Total #/ pieces			
New Missions identified as of <b>1-Oct-11</b>		What			
at 1500 Local		<b>NONE</b>	<b>NONE</b>		
Mission #	<b>T-101</b>	-----			
Priority	<b>URGENT</b>	-----			
<b>WHO WHO is Requesting US Military Assistance?</b>		-----			
Name, Pos	<b>Chivers, Dana</b>	-----			
Org/Office	<b>OFDA DART Civ-Mil Coordinator</b>	-----			
email	<b>dchivers@ofda.gov</b>	-----			
phone	<b>+1. 571.594-3937</b>	-----			
<b>WHAT WHAT type of Service or Goods are Requested?</b>		total			
Describe as clearly as possible what you want the military to do	<b>Transport DART team on Aerial Recon of effected routes (Hwy1 &amp; 2) to the south of the Capitol</b>	-----			
<b>WHEN WHEN is it needed?</b>		-----			
Date(s) & Time(s)	<b>ASAP - request NLT 24 hours from now.</b>	-----			
<b>WHERE WHERE is it needed? ...and HOW</b>		<b>PASSENGERS to be moved? TOTAL: 5</b>			
<b>If the request is for a static position:</b>		Organization	Name & Position	Nationality	
Site Name	<b>N/A</b>	DART	<b>Dana Chivers, Civ-Mil Coordinator</b>	<b>USA</b>	
Grid	<b>N/A</b>	DART	<b>John Gambulputty, DART Tm Ldr</b>	<b>USA</b>	
POC on-site & contact info	<b>N/A</b>	USAID/Titan	<b>Bobby Houne, USAID MDRO</b>	<b>USA</b>	
		Min of Emerg	<b>Goula Harnii, Vice Minister</b>	<b>Titan</b>	
		IOM	<b>Francois Dubunet, IOM Field Officer</b>	<b>France</b>	
		Time on Objective & Special Instructions	<b>Mr. Harnii will need to be dropped off at the village of Queriiia. All others get off with him for a 30 minute meeting vic the LZ, then need to get back on for transport back to base. Mr Harnii will stay at the village</b>		
		<b>WHY WHY is this requested of the military?</b>			
		Is the military your choice of last resort?	<b>No civilian assets available at this time</b>		



# LORELEI Situation Frame Highlights

## Low Resource Languages for Emergent Incidents

**<Situation> ::= <Need> ! <Issue>**

**<Need> ::= Water Supply ! Food Supply ! Shelter ! Medical Assistance !  
Utilities, Energy, or Sanitation ! Infrastructure ! Search/Rescue  
! Evacuation**

**+ ( Urgent ! Not Urgent ) + ( Current ! Past ! Future )**

**+ <Place>**

**<Issue> ::= Civil Unrest or Widespread Crime ! Terrorism or other Extreme  
Violence ! Regime Change**

**<Place> ::= ( <LOC> ! <GPE> ! Unknown )**



## LoReHLT16 Evaluations



NIST's new Low Resource human language technologies (LoReHLT) evaluation series aims to advance HLT that can provide rapid and effective response to emerging incidents where the language resources are very limited. Participation in LoreHLT is open to anyone who finds the task(s) of interest. LoReHLT 2016 offers three tasks:

- Machine translation (MT)
- Situation Frame (SF)
- Named entity recognition (NER)

## Highlights

- Surprise language evaluation
- Two training conditions: constrained (required) and unconstrained
- Three evaluation checkpoints to gauge performance based on time and training resources given



# Data from Haiti 2010 Earthquake

- **Mission 4636**
  - SMS Service during 2010 Earthquake for people to send messages requesting help
  - <http://www.mission4636.org/>
- **Ushahidi Collaboration Platform**
  - Volunteers translated and annotated requests and shared with responders
  - <http://www.ushahidi.com/>
- **Data publicly available**
  - [pydata book on github.com](#)
  - [Haiti Crisis Map on datahub.io](#)





# Sample Mission 4636 Message\*

Nou nan zòn tigwav nou ta renmen pou nou èd men fok se pajan mwen wè mesye minista ap fè moun yo nou bezwen anpil tant ak medikaman pou grip la fyè ak no Time: 2010-01-28 23:31:13

**LORELEI seeks to enable English speakers to respond in HADR scenarios without knowing the local languages.**





# Message #2517\* from Haiti 2010 Earthquake

Nou nan zòn **tigwav** nou ta renmen pou nou èd men fok se pajan mwen wè mesye minista ap fè moun yo **nou bezwen anpil tant ak medikaman pou grip** la fyè ak no **Time: 2010-01-28 23:31:13**



## Situation Frame

**ID** HT2010EQ01-U2517

**Type** Need Shelter, Medical

**Entities** UNK

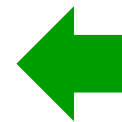
**LOC** Petit Goave

**Time** 2010-01-28 23:31:13

**SEC** NONE

**Subtopic** NONE

## From Gazetteer:



**Name** Petit Goave

**Equiv** tigwav

**LAT** 18.37743

**LON** -72.93157

\*Ushahidi Data: <https://github.com/pydata/pydata-book/blob/master/ch08/Haiti.csv>



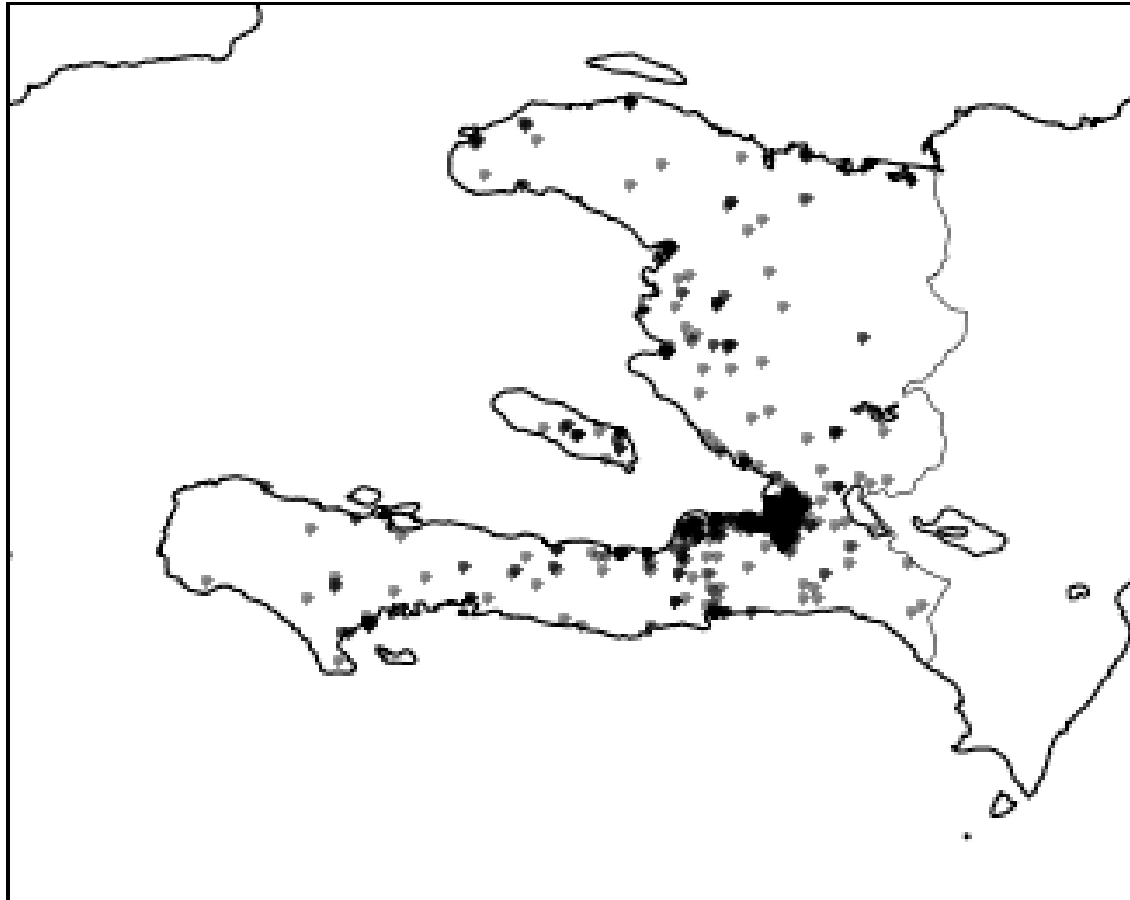
# “Signal” in Low Resource Language “Noise”

- Trends and “Dots on a Map”
- Use confidence levels to help aggregate information



# Dots on a Map

2a: Food Shortage



- <https://github.com/pydata/pydata-book/blob/master/ch08/Haiti.csv>
- <http://datahub.io/dataset/ushahidi/resource/81d058a8-173a-49d9-8ce9-4edf5e7cafc9>



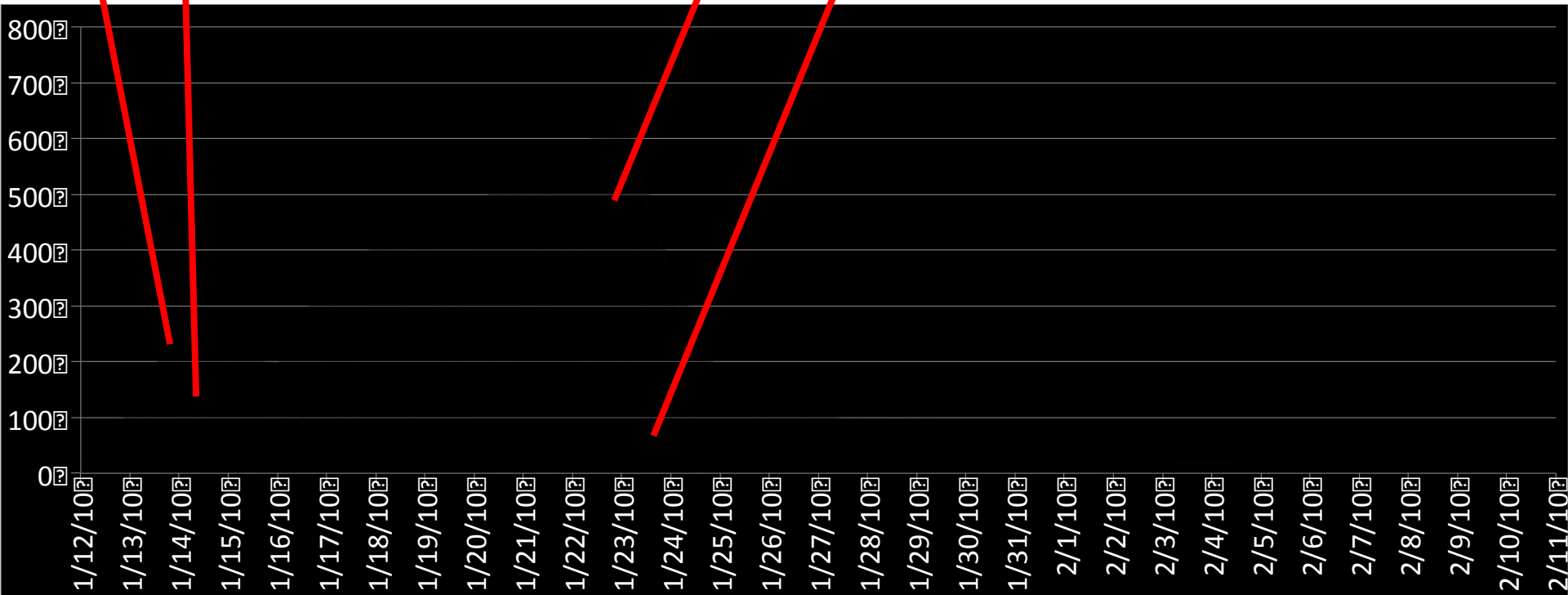
# Trends in Message Categories

Persons News

Water Shortage

Collapsed structure

Food Shortage



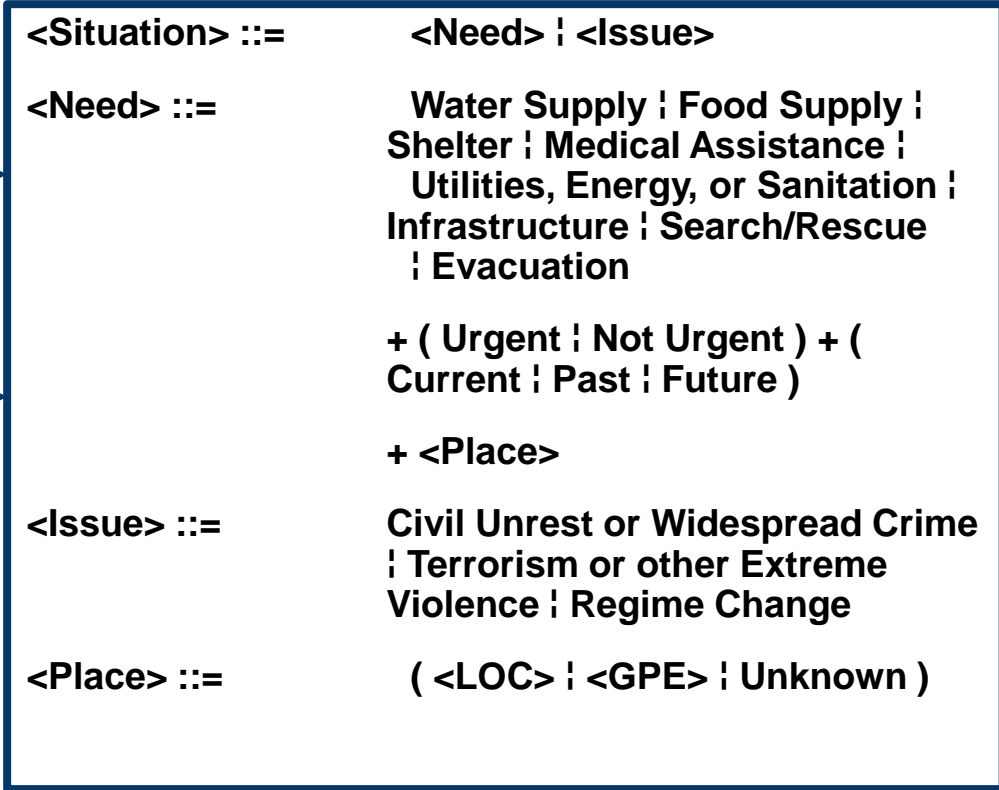


# MT may be neither necessary nor sufficient for HADR mission relevance

Foreign Language

Foreign Language

English



High volume, uncertain inputs acceptable if aggregate output is useful



# Concept of Evaluation

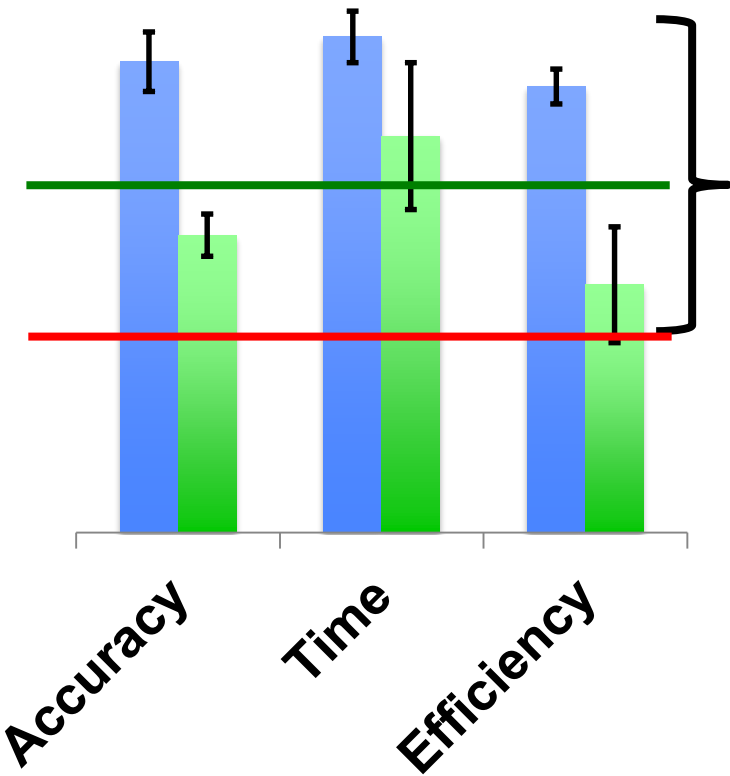
- **Inject LORELEI analytics into HADR exercise from low-resource language messages (social media, i.e.: Twitter)**
- **Measure outcomes: i.e.:**
  - Accuracy of Decision
  - Time to Right Decision
  - Reduction of Overlapping Effort (Efficiency)
- **Vary conditions for Situation Frames (SF) from Low Resource Languages: i.e.:**
  - Reference SF
  - System SF



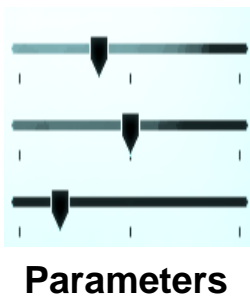
# Concept of Experiment

## Situation Frames

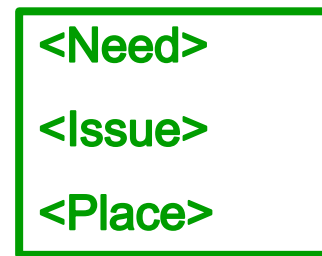
■ Reference  
■ System



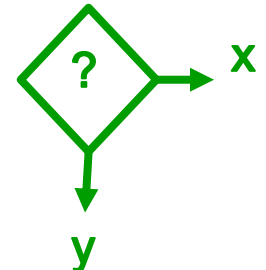
Technology Opportunity Zone



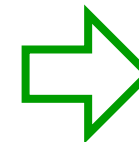
HADR Participant Experiments



Situation Frame



Decision





# THANKS

**Doug Jones DAJ@LL.MIT.EDU**