Pamela McCauley Bush Human Factors in Disaster Management Research Team at the University of Central Florida

Ryan Bank Social Intelligence Corporation

Andy Vidan MIT Lincoln Laboratory

Dom Tolli American Red Cross

Nigel Snoad Google Crisis Management

Mobile Devices In Disaster Readiness and Response

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Ryan Bank

- Social Intelligence Corporation

Mobile Devices In Disaster Readiness and Response

Ryan Bank
Social Intelligence Corporation

Stemming from the 2010 Haiti Earthquake, Ryan Bank, founder of Social Intelligence Corp and advisor to the US Coast Guard, built a system that was able to locate the position of survivors trapped in the rubble of the earthquake using their ability to post to social networks.

Similar systems have also been deployed to major events such as the BP Oil Spill, Japan Tsunami and G8 and NATO Summits.

The system used social media monitoring to find survivors after the 2010 Haiti earthquake in Port-au-Prince, Haiti.

Bank will show how almost any organization can use social data and emerging technology to boost situational awareness, find those in distress and determine threats against people and infrastructure.

Mobile Devices In Disaster Readiness and Response

Dr. Andy Vidan

MIT Lincoln Laboratory

Mobile Devices In Disaster Readiness and Response

Dr. Andy Vidan
MIT Lincoln Laboratory

Dr. Andy Vidan has been involved in a broad range of research programs related to homeland security and defense at MIT Lincoln Laboratory, where his work includes systems analysis, architecture and technology assessments, and prototype development.

He serves as the technical lead for the Laboratory's Distributed Disaster Response program, developing advanced technology solutions in support of large-scale crisis response and management. This technology, deployed as the Next-Generation Incident Command System, is being used in a variety of response operations, including combating major wild-land fires in Southern California.

Dr. Vidan also served on the U.S. Southern Command assessment team that responded to the 2010 Haiti earthquake.

Mobile Devices In Disaster Readiness and Response

Dom Tolli

American Red Cross

Mobile Devices In Disaster Readiness and Response

Dom Tolli
American Red Cross

Dom and his team have built Smartphone apps that put critical information and services at people's fingertips when they need it most. Having this information in people's pockets when they need it most will save lives and reduce suffering.

From the First Aid app to the Hurricane app to the soon to be -released Earthquake app, all of these tools empower people with the knowledge they need at the time they need it.

Building upon the work of staff at the St. Louis chapter and executives of Anheuser-Busch, Dom and his team have created a revised Ready Rating service to help businesses, schools, and organizations assess and improve their disaster readiness.

Mobile Devices In Disaster Readiness and Response

Nigel Snoad

- Google Crisis Response

Mobile Devices In Disaster Readiness and Response

Nigel Snoad
Google Crisis Response

Nigel is a product manager for Google's Crisis Response team, which is changing how citizens stay informed during crises by providing information and tools to help people collaborate during emergencies and build resilient communities.

Before joining Google in 2011, Nigel led R&D on humanitarian systems at Microsoft and spent several years at the United Nations helping lead pandemic contingency planning and the UN Joint Logistics Center's responses in Iraq, after the 2004 tsunami and in Darfur.

Nigel has taught courses in Humanitarian Design at Parsons the New School for Design, partnering with groups like the World Bank and the Red Cross to develop innovative design-thinking approaches to complex humanitarian and development problems.

Mobile Devices In Disaster Readiness and Response

Pamela McCauley Bush

University of Central Florida

Human Factors in Disaster Management Research Team

Mobile Devices In Disaster Readiness and Response

Pamela McCauley Bush, Ph.D., CPE
University of Central Florida
Human Factors in Disaster Management Research Team

Dr. Pamela McCauley Bush is a nationally recognized speaker, entrepreneur, author and Professor in the Department of Industrial Engineering and Management Systems at the University of Central Florida where she leads the Human Factors in Disaster Management Research Team.

2012 U.S. Fulbright Scholar Specialist Program Awardee for the US-New Zealand Human Engineering and Mobile Technology in High Consequence Emergency Management program.

Development of a communications model for representing flow of information in an Emergency Operations Center and evaluative research on the use of hand-held communications tools to support key personnel in emergency management.

A Quantitative Model for Assessing Mobile Technology

Human Factors and Ergonomics in Disaster Management

ICT in Disaster Management

* Information and Communication Technologies (ICT) have had a transformative impact on disaster management
  * ICT is used in almost all phases of the disaster management process.
  * ICT can be used to minimize the impact of disasters in many ways.
  * It is essential that ICT is given its due place in disaster management but it should also not be taken as panacea for every need
  * Mobile technology has become highly relied upon in response, even in developing nations

How has Mobile Technology Impacted Response

* Greater breadth and depth of information
* Faster access to information
* Enhanced community involvement
* Result: Better decision making

Challenges

* Over-reliance of community on non-official information sources
* Information overload
* Extreme dependence on technology
* Tendency to minimize the importance of official information
* *Difficulty in determining the most appropriate mobile technology … UCF HFDM Research focus!*

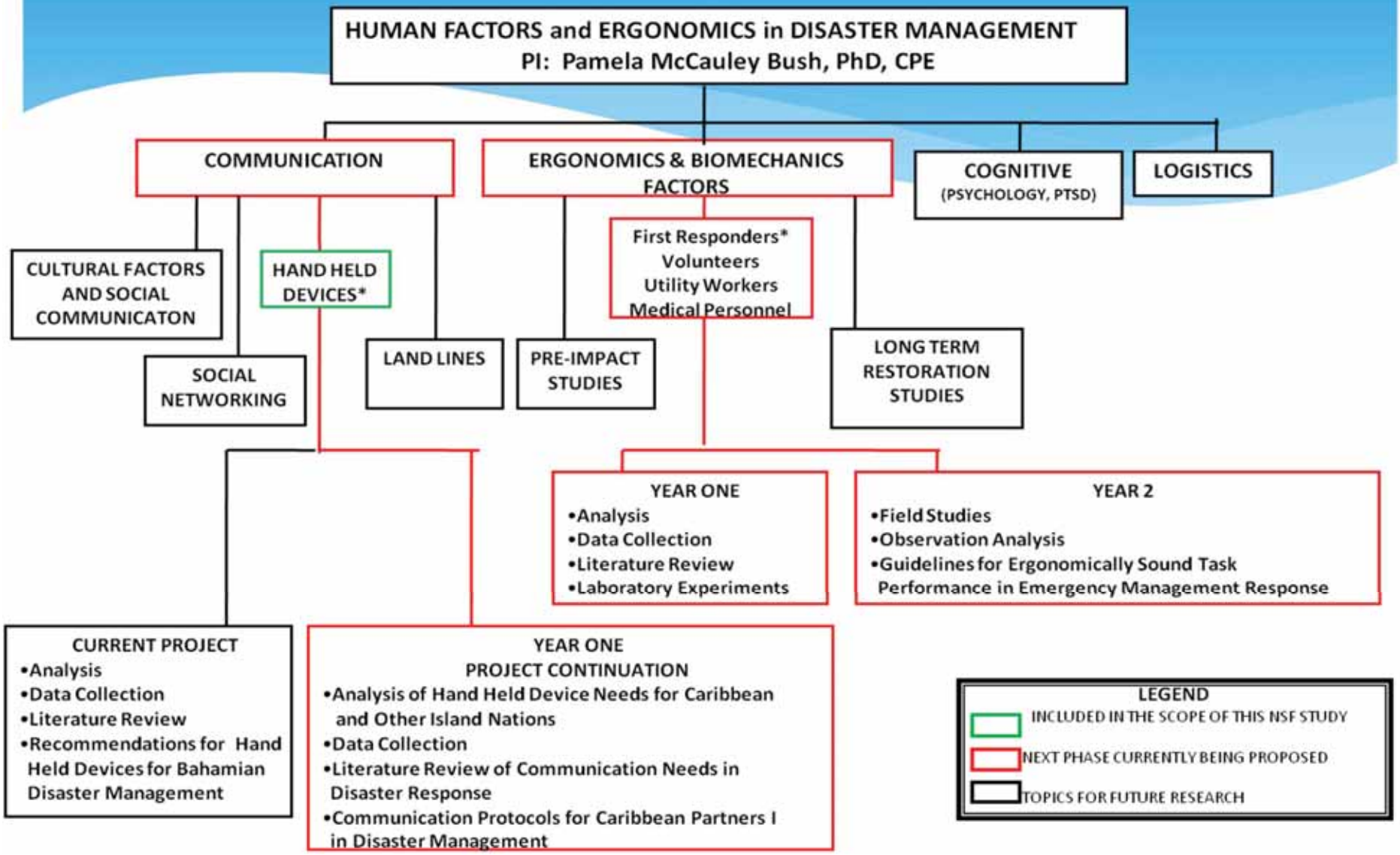
UCF Human Factors in Disaster Management Research Team

* National Science Foundation funded research to study the use of mobile technology in disaster management from a human factors and ergonomics perspective
* Develop models to assess and quantitatively evaluate mobile devices

Significance

- Wireless communication is used extensively in emergency management, yet it has not been officially implemented in the emergency management policies of many counties, states and countries
- The human factors and usability issues associated with utilizing these devices during emergencies have not fully evaluated
- *A broadly accepted methodology for assessing these devices specifically when used during emergencies does not exist.*

Overview of Research



Research Methodology

* Background & literature review
  * Academic publications
  * Review manuals, instructions and guidebooks for hand held devices
  * Emergency management standard operating procedures,
  * Emergency Support Functions
* Data Collection
  * Community Survey
  * Emergency Management Professionals Survey
  * HFE Assessment of mobile devices
* Determination of Device Selection Factors
  * Determine levels of existence for factors
* Ergonomic Equipment Evaluation
* Development of aggregate mathematical model
* Model Validation
  * Laboratory Testing

Mobile Technology Evaluation

Mathematical Model

Mathematical Model Parameters

* Categories:
  * Usability factors
  * Device selection factors
  * Portability factors

Usability Factors Identified

* Ease of learning
* Efficiency of use
* Ease of remembering
* Frequency of errors
* Subjective pleasure

Device Selection Factors

* Audio clarity
* Portability
* Accommodation to environmental lighting
* Battery life and type
* Text entry method
* Grip
* Screen size
* Durability
* Unit cost

Portability Factors

* Initial physical factors associated with mobile devices
  * Weight
  * Width
  * Length

Overall Mathematical Equation

* HFE Rating = $U_1a_1 + DS_2a_2 + P_3a_3$

* Where:
  * *HFE Rating = overall human factors and ergonomics rating for device use in emergency management*

  * U_1 = *Usability rating*
  * a_1 = *Relative significance of Usability*

  * DS_2 = *Device Selection Factors Rating*
  * a_2 = *Relative significance of Device Selection Factors*

  * P_3 = *Portability Rating*
  * a_3 = *Relative significance of Portability*

Usability Rating (U)

* $U = g_1 b_1 + g_2 b_2 + g_3 b_3 + \ldots + g_n b_n$

* Where:
  * *U = Usability rating*
    * g_o = rating of existence for each usability factor
    * b_k = weighted priority for each usability factor

Device Selection Rating (DS)

* $DS = j_1d_1 + j_2d_2 + j_3d_3 + \ldots + j_nd_n$
  * *j_n= Rating for each device selection factor*
  * *d_n = Weighted importance of each device selection factor*
  *

Portability Rating (P)

* $P = h_1c_1 + h_2c_2 + h_3c_3 + \ldots + h_nc_n$
  * *h_n= Rating for each portability factor*
  * *c_2 = Weighted importance of each portability factor*

Overall Mathematical Equation

* $HFER = U_1a_1 + DS_2a_2 + P_3a_3$

* Where:
  * *HFER = overall human factors and ergonomics rating for device use in emergency management*

  * U_1 = *Usability rating*
  * a_1 = *Relative significance of Usability*

  * DS_2 = *Device Selection Factors Rating*
  * a_2 = *Relative significance of Device Selection Factors*

  * P_3 = *Portability Rating*
  * a_3 = *Relative significance of Portability*

Conclusion

- Preliminary mathematical model has been developed and validated
- Research is ongoing to further refine, validate, and expand the mathematical model
- *Additional Human Factors & Ergonomic research is needed in the areas identified in Emergency management and civilian use of mobile devices in disaster management*

Panel Discussion