International Goals for Resiliency

4th Conference on Community Resiliency
Davos, Switzerland
29-30 August 2013

Professor Saifur Rahman

Advanced Research Institute
Virginia Polytechnic Inst & State University, U.S.A.
www.ari.vt.edu

Virginia Tech Research Center
Arlington, Virginia, USA
www.saifurrahman.org
Definitions of Resiliency

**US:** “The ability to resist, absorb, recover from or successfully adapt to adversity or a change in conditions”

**UK:** “The ability of the community, services, area or infrastructure to detect, prevent, and, if necessary to withstand, handle and recover from disruptive challenges”

**Germany:** Strategic objectives like schnellstmögliche Wiederherstellung (quickest possible restoration)

---

Why is Resiliency Important? 
Hurricane Sandy in USA in 2012
Aftermath of Hurricane Sandy in the US

Impact of Hurricane Sandy in New Jersey, USA

Source: EPRI
Floods in Austria & Bangladesh

German Floods in June 2013

Source: CEDIM, KIT
Cyclone Sidr in Bangladesh in 2007

Source: www.whyfiles.org

Cyclone and Storm Surge

Cyclone

About 7% of the country with a population of 10 million live in the cyclone zone.

1970: c. 500,000 people lost their lives
1991: c. 138,000 human deaths,
property losses US $1.78 billion.
Earthquake and Tsunami
Japan, March 2011

Effects of Japan Tsunami
Following the Earthquake

Source: public.iastate.edu
Source: thearrowsoftruth.com
Fukushima Dai-ichi Nuclear Power Plant in Japan

Before

After

Devastation from Tsunami Following the Earthquake

Sources: isis-online.org and pinktentacle.com

Source: myselfanand.com

Source: now4us.blogspot.com
Impact on Critical Infrastructures: Major Floods in Europe, Aug 2002

Major infrastructures were severely damaged by high water levels:
- Electricity outages
- Telecommunication links cut off
- Public transportation systems damaged
- Gas service cut
- Clean water contaminated

Mobile GSMs were the only communications means available for the rescue teams

Asymmetric Threat and Risk Environment
International goals

- Save lives and property
- Recover quickly and resume normal operations
- Minimize future impacts

Critical Infrastructure Protection
Past, Present and Future

- **Past:** Vulnerability Assessment at the Organization/Facility Level

- **Present:** Past 9/11 – Three G’s (Gates, Guards, Guns)

- **Future:** Resiliency
Resilient physical and social systems must be robust, redundant, resourceful, and capable of rapid response.

**Resilience has 4 Qualities**

- **Robustness:** the inherent strength or resistance in a system to withstand external demands without degradation or loss of functionality.
- **Redundancy:** system properties that allow for alternate options, choices, and substitutions under stress.
- **Resourcefulness:** the capacity to mobilize needed resources and services in emergencies.
- **Rapidity:** the speed with which disruption can be overcome and safety, services, and financial stability restored.

Flood Protection in Austria

Proposed Energy-Autonomous and Anti-Disaster Smart Building in Japan

Six-story building for 15 Families

Source: Ryuichi Yokoyama, Waseda University, Japan
Shelter on Stilts in Bangladesh

Cyclone (Hurricane) Shelter Site Design

Source: J.R. Chowdhury, UAP, Bangladesh
Situational Awareness as a Part of Resiliency Planning

Source: EPRI
Customer Resilience is also a part of the solution

Fuel Cell installed at Whole Foods in Fairfield, CT
Source: Whole Foods

Source: VT-ARI and EPRI

Thank you for your attention

Saifur Rahman
srahman@vt.edu
Professor and Director

www.saifurrahman.org