### WHAT IT MEANS TO US

- **Infrastructure**
  - Power
  - Cooling
- **Critical Systems**
  - Email
  - Network
  - Data Access
  - Cyber Security
- **Disaster Management**
  - Protocols
  - Remote Access
  - Recovery

### DISASTER RECOVERY

- **Man-made**
  - 2003 Blackout
  - 2005 accidental activation of EPO switch
  - 2010 accidental failure of ATS during UPS maintenance
- **Natural disasters**
  - 2011 Hurricane Irene
  - 2012 Hurricane Sandy
  - 2013 Superstorm Nemo

### POWER AND COOLING

- Redundant power (utility + UPS) for racks housing critical services
  - Email
  - Remote Access
  - Batch
  - Storage Services (NFS, AFS, HPSS)
  - Service redundancy
    - Physical (cold and hot spares)
    - Virtual

### NETWORK

- Network
  - ESNET provides multiple paths to WAN
  - Redundant paths to LHCOPN

### LIMAN DIVERSE FIBER PATHS

- RACF spread in 3 distinct physical areas
  - BCF (~5000 ft² or 465 m²) since 1998
  - Sigma-7 (~2000 ft² or 185 m²) since 2008 – converted lab space
  - CDCE (~6000 ft² or 560 m²) since 2009 – new building

### 2003 BLACKOUT

- 2003 Blackout

### 2011 HURRICANE IRENE

- 2011 Hurricane Irene

### 2012 HURRICANE SANDY

- 2012 Hurricane Sandy

### 2013 SUPERSTORM NEMO

- 2013 Superstorm Nemo

### SYNAPSENSE

- Synapsense
  - Completed Sept. 2013

### WHAT WE LEARNED

- Generator(s) for CRAC units
  - UPS only backs up data center equipment
  - Risk of overheating and electrical fire
  - Funding in place to address it partially (Sigma-7 for now)
- Remote monitoring of PDU’s and CRAC units
  - Only indirect monitoring for now
  - Full deployment of Synapsense (completed Sept. 2013)
- Remote Access
  - Essential for staff to keep facility operational
  - Connectivity options
  - Do not assume wired/wireless ethernet is available
  - Provide VPN connectivity
  - Tethering to cell phone network?
  - Do not assume all staff will have connectivity
  - Designate staff roles accordingly
- Auto shutdown procedure
  - Tied to monitoring
  - Essential if danger of flooding or electrical fire is non-negligible
- 9 x 5 or 24 x 7 coverage are not the only models
  - Operators cover off-hours and weekends (16x7 model)

### STILL TO DO

- Designate staff roles accordingly
  - Remote monitoring of PDU’s and CRAC units
  - Only indirect monitoring for now
  - Full deployment of Synapsense (completed Sept. 2013)