National Mass Patient and Evacuee Movement, Regulating, and Tracking System

2008 NDMS Conference

Project Origin

- Purpose: Outline a proposed strategy / development for a National Patient / Evacuee Movement, Regulating and Medical Tracking System

Project Origin

- The National Response Plan (Catastrophic Incident Supplement) includes scenarios in which up to 100,000 casualties may require transport, regulating and medical tracking from incident site, to healthcare facilities for definitive care.
- May need to be transferred to other intermediate dispositions (rehabilitation centers, nursing homes, etc.), and then, to final disposition (e.g. home, family member, morgue).

Project Origin

- Proposed by DOD (2004), Requested DHS/ FEMA funding
- DHS Priority (2004); Secretary Ridge's Homeland Security Interagency Security Planning Effort
- Included patient mobilization planning for catastrophic events as a long-term initiative and identifies this effort as a high-priority (Reference: Secretary, Department of Homeland Security letter to Secretary, Department of Defense, September 22, 2004).

Project Origin

- Led by HHS / Agency of Healthcare Research and Quality - DOD supports the Initiative
- Funded by DHS, HHS, DOD
- Began 2005, Final Report to HSC and interagency - March 2007
- Supported by DOD Patient / Evacuee Tracking Initiative (evacuee-patient tracking system)

Project Background

- AHRQ funded project
  - AHRQ Project Officer: Dr. Sally Phillips
  - Project undertaken in collaboration with FEMA, DoD, and HHS/OPHEP
  - Co-led by AHRQ and DoD
  - Project steering committee
- Key project staff
  - Tom Rich (Abt Associates)
  - Dr. Paul Biddinger (Mass General Hospital)
  - Dr. Richard Zane (Brigham and Women's Hospital)

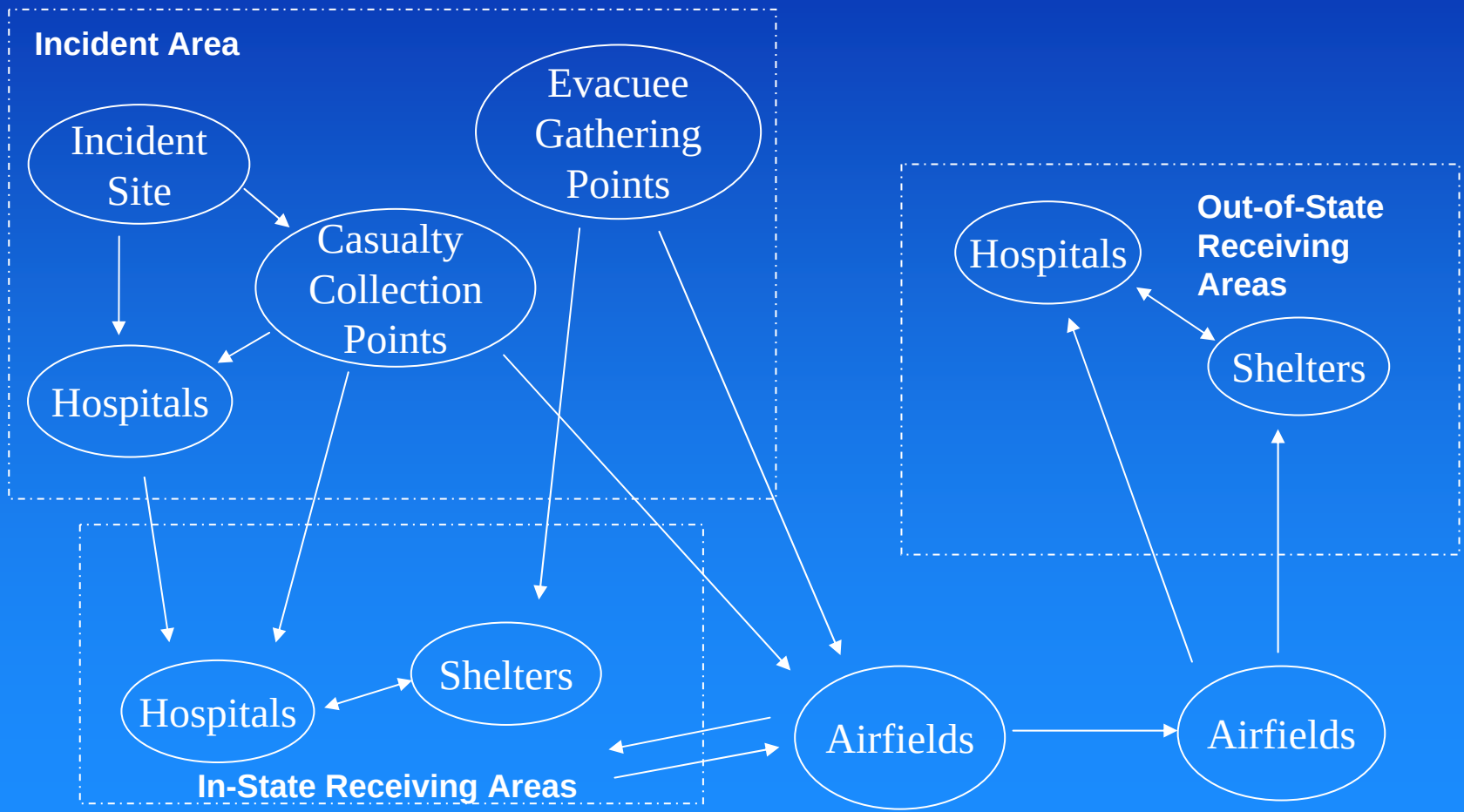
Project Steering Committee

- HHS
- DOD
- FEMA
- DOT
- VA
- CDC
- DHS
- HSC
- State, Local representatives

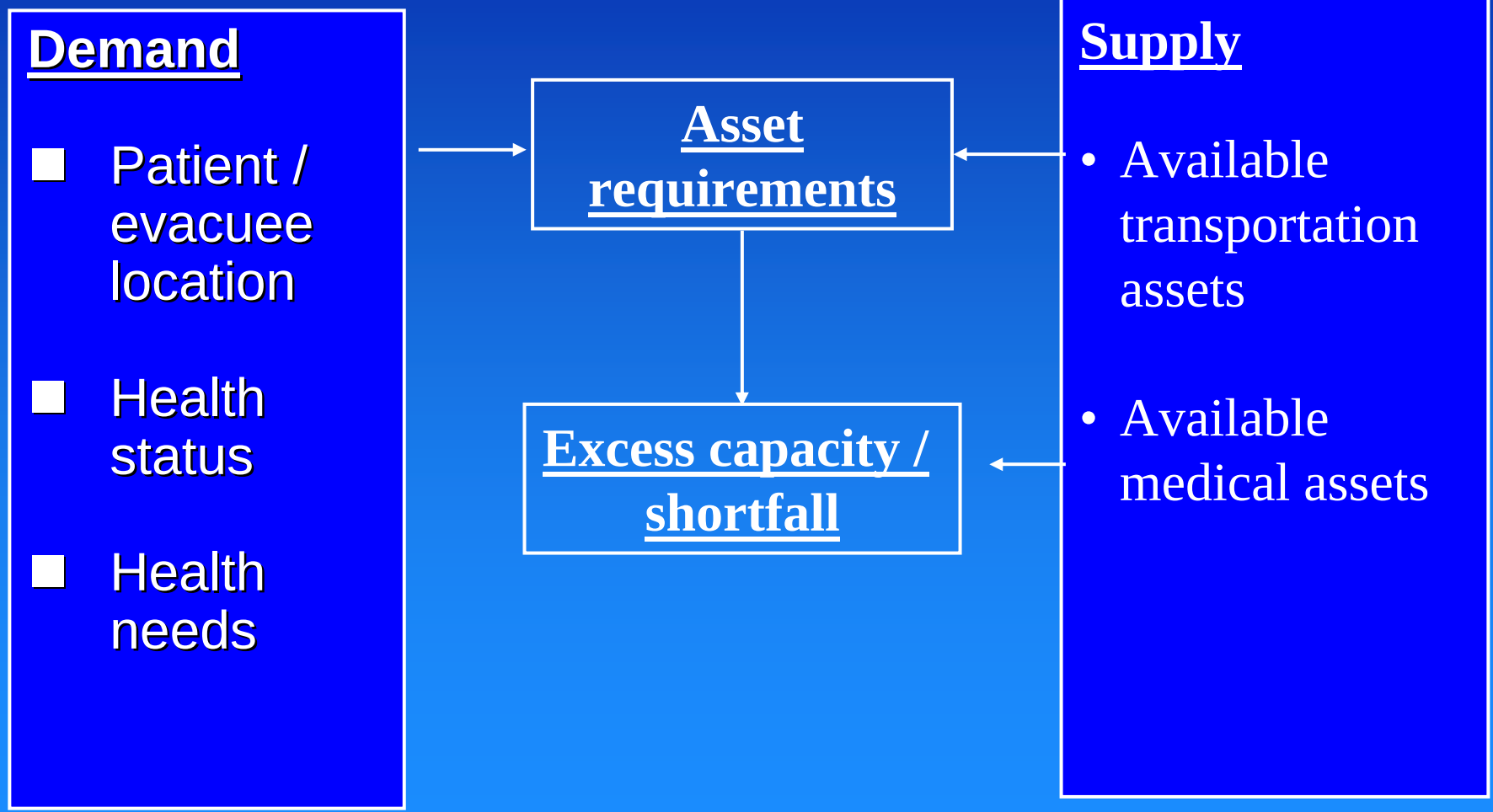
Key Project Goals

- Develop recommendations for a National System that could be used **DURING** a multi-jurisdictional mass casualty / evacuation incident to:
  - locate, track, and regulate patients and evacuees
  - provide decision support for patient and/or evacuee movement, regulating, resource allocation, and incident management
- Develop a web-based planning tool that estimates the time required to evacuate health care facilities

Focus on Multi-Jurisdictional Incidents



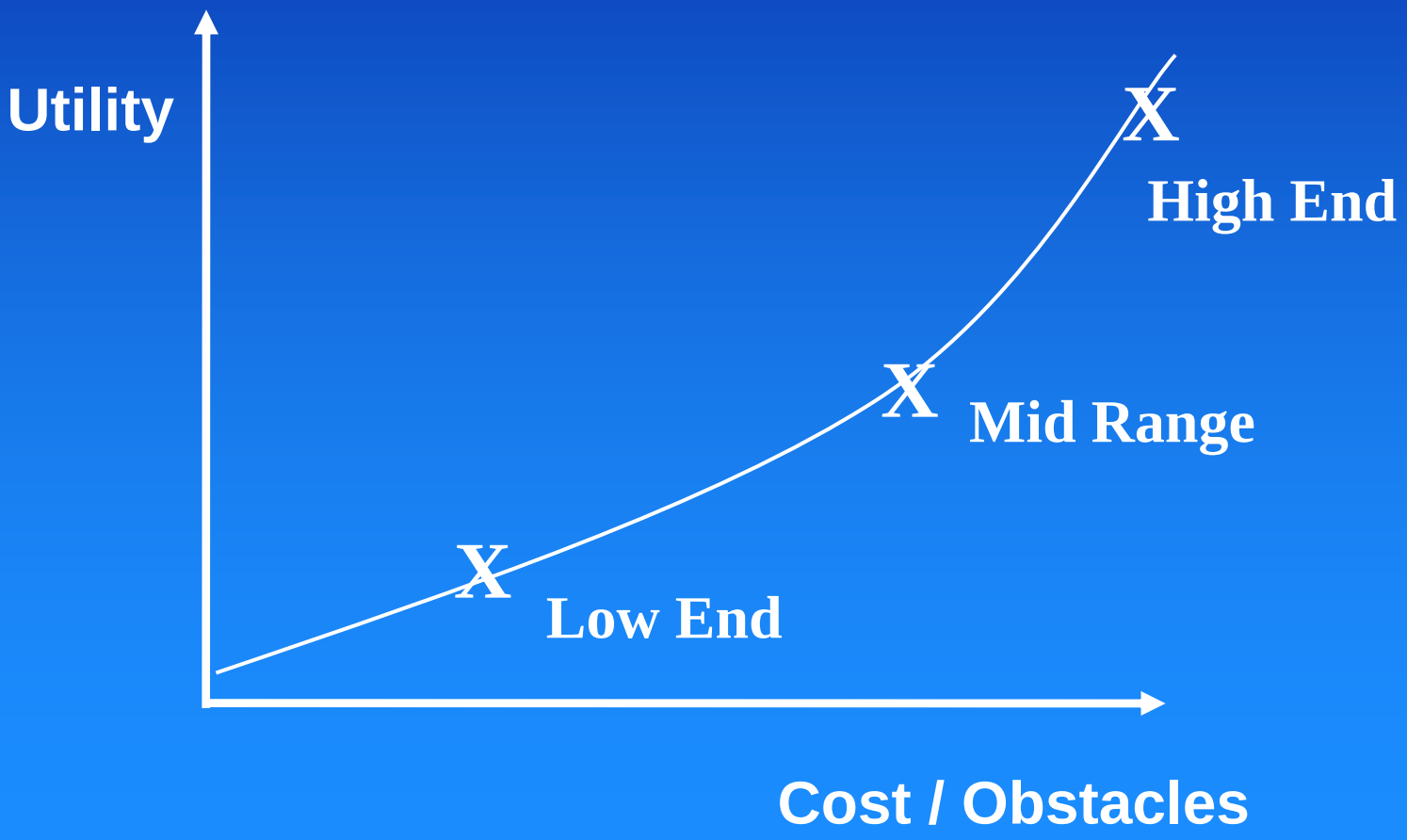
System Concept



Sample Questions the System Could Answer

- **The Public**: Where is my loved one?
- **Incident Commanders**: How many victims are there? Where are they? Where are more response assets needed?
- **Emergency Operations Centers**: How many patients and evacuees exist? Where is there unused capacity? Will I need outside assistance?
- **DOD**: What federal transportation, medical and other assets will be needed to supplement local and state assets to transport patients and evacuees?
- **Emergency Managers**: Who exactly is coming on that plane of evacuees and patients?
- **Public Health Department / Relief Organizations**: How many people are in shelters and what are their specific needs?

Trade-Offs Exist With Low-End, Mid-Range, and High-End Systems



Variables Distinguishing Low, Middle, and High-End Systems: Demand Side

- 24/7 vs. activated system
- Tracking vs. locating vs. aggregate location data
- Public use vs. emergency response
- Entry points
- Types of data collected
- Data collection and identification technology
- Integration with existing local systems
- Ease of use
- Levels of aggregation and access
- Technology sophistication and independence

Existing Systems: Demand Side

- Patient Tracking Systems
  - Few jurisdictions routinely track patients between locations
  - DOD has patient tracking system for battlefield casualties and NDMS use (TRAC2ES, JPTA)
- Location Systems
  - “Registration” systems (protected by firewalls and privacy restrictions) at any institution
  - “Loved ones” databases
- Pre-Evacuation Databases
  - A few jurisdictions allow citizens to register for assistance

Project Assumptions:

- Activated system
- Track both location and health status of each person as they encounter the system.
  - Track at “touch points”, which include overnight facilities, temporary staging areas/collection points, and (possibly) vehicles loading/unloading
  - Require minimum data elements to login or update, but build system to accept more detailed demographic and medical information
  - Build from person-level data, but accept aggregate (location-level) data

Project Assumptions (continued)

- System is accessible to both public and emergency responders / planners
  - Data access and reporting must be tightly controlled
- Build on existing systems as much as possible
- Build on daily-use systems as much as possible

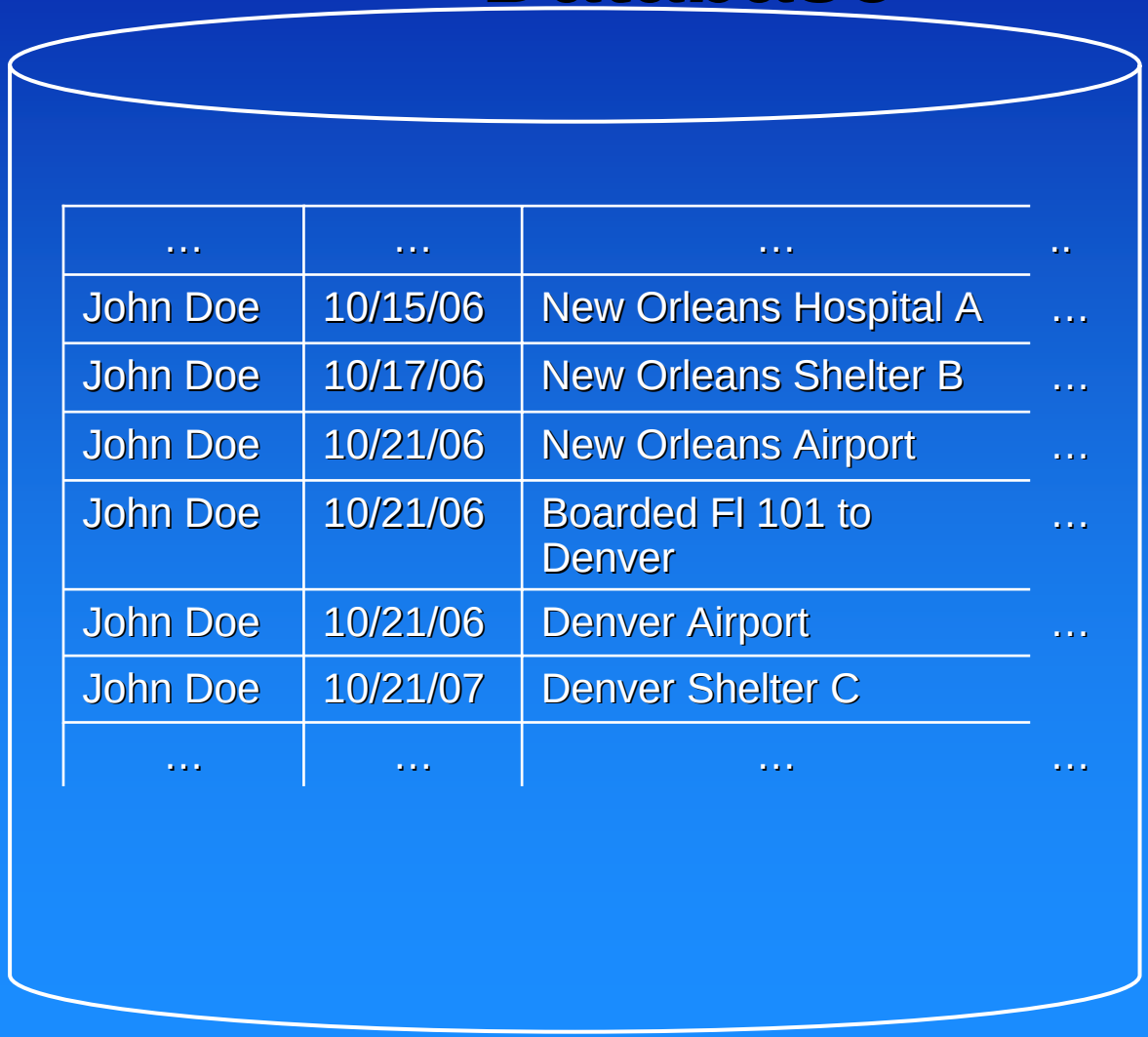
Minimum Data Elements

- **Unique identifier** (a universal algorithm for assigning IDs would be ideal)
- **Name, gender, DOB** (if not available, substitute age range, race and notable physical characteristics to help identify the person)
- **Health Status**
  - **Red, yellow, or green triage color**
  - **ICU, floor, or discharge ready/not**
  - **Acutely ill, well with medical history (needing medical attention), healthy**
- **Last updated location (ID/name/type), date, time**

Other Important Data

- Arrival or departure (arriving at hospital vs. departing from hospital)
- Language (English, other)
- Special transportation needs: ALS/BLS ambulance, wheelchair
- Special medical needs: ventilator, oxygen, dialysis, current medications, cardiac monitor
- Contamination/radiation/contagious status
- Security/supervision needs/status (psychiatric patients, prisoners)
- Family unification code (to link family members to each other)
- Final "exit" status (dead, left with relatives, went home)
- Attached files (medical records and images)

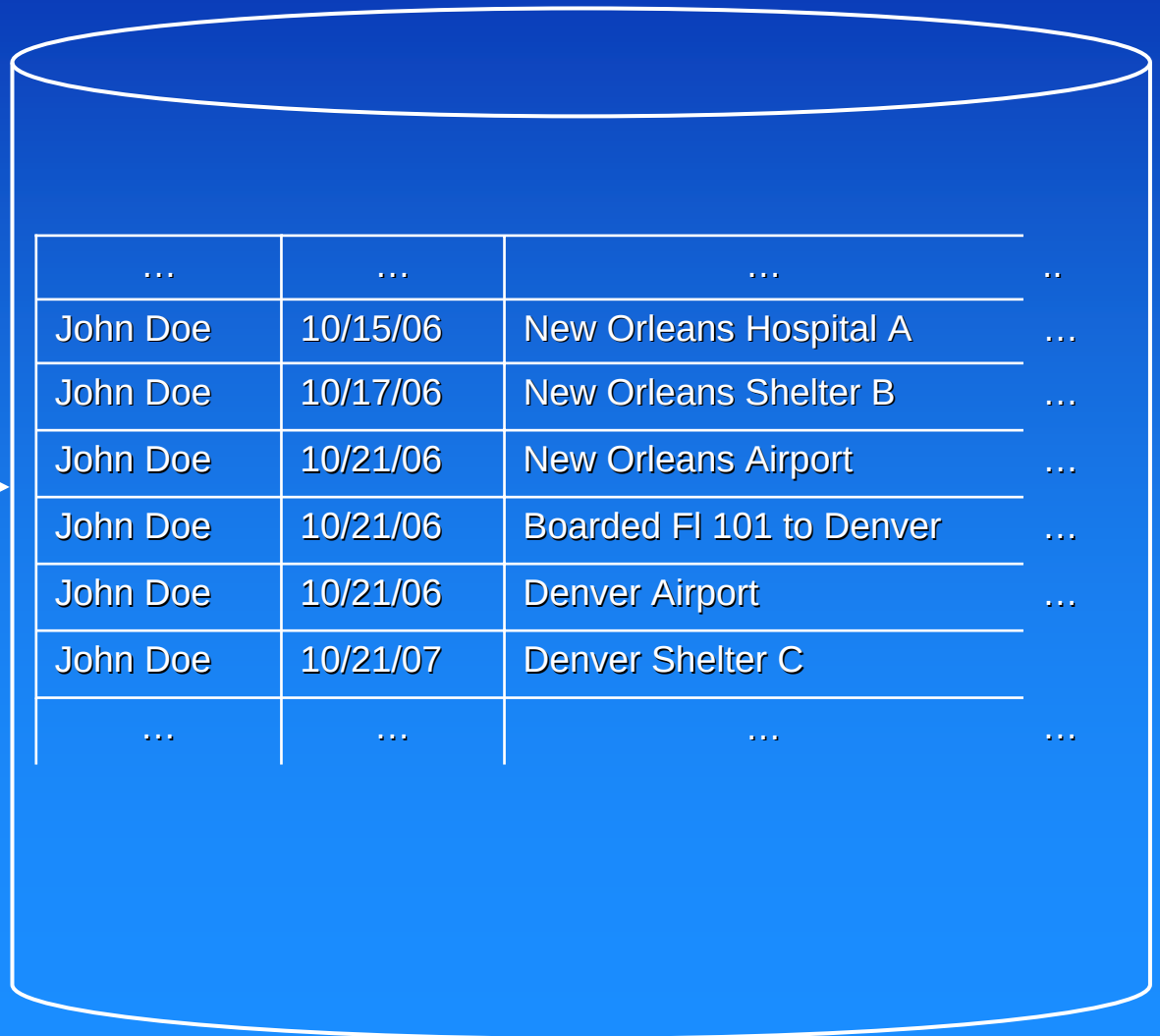
Key Component of the National System: An Incident-Wide Tracking Database



…	…	…	..
John Doe	10/15/06	New Orleans Hospital A	…
John Doe	10/17/06	New Orleans Shelter B	…
John Doe	10/21/06	New Orleans Airport	…
John Doe	10/21/06	Boarded Fl 101 to Denver	…
John Doe	10/21/06	Denver Airport	…
John Doe	10/21/07	Denver Shelter C	
…	…	…	…

Illustrative Use: Locating a Loved One

Where is John Doe?



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…	…	…	…

Illustrative Use: Obtaining Information on Incoming Patients or Evacuees

Who is on Flight 101 to Denver?

…	…	…	..
John Doe	Flight 101	Patient (ICU)	…
Jane Doe	Flight 101	Patient (Green)	…
Baby Doe	Flight 101	Evacuee (Healthy)	…
John Smith	Flight 101	Evacuee (Medical)	…
David Jones	Flight 101	Patient (Yellow)	…
Sarah Jones	Flight 101	Evacuee (Healthy)	
…	…	…	…

Illustrative Use: Incident Scope Based on Aggregate Casualty Data

Location of Casualties	Total	Red	Yellow	Green
Incident Site	800	400	350	50
+ Casualty Collection Points	1,500	750	500	250
+ Hospitals	1,750	1,500	100	150

Success Depends on Integration with Existing Systems

- Current or Planned Feeder Tracking Systems
  - Jurisdiction-specific systems (e.g., commercial systems)
  - Agency-specific systems (e.g., TRAC2ES, JPTA)

Success Depends on Integration with Existing Systems

- Feeder Institutional Records Systems ("Check In / Check Out Systems")
  - All facilities using a common software platform (e.g., all hospitals running Vendor X's software)
  - All facilities within an agency (e.g., National Shelter System)
  - Single facility (e.g., a hospital with a "homegrown" system)

Integration Between Feeder Systems and the National System

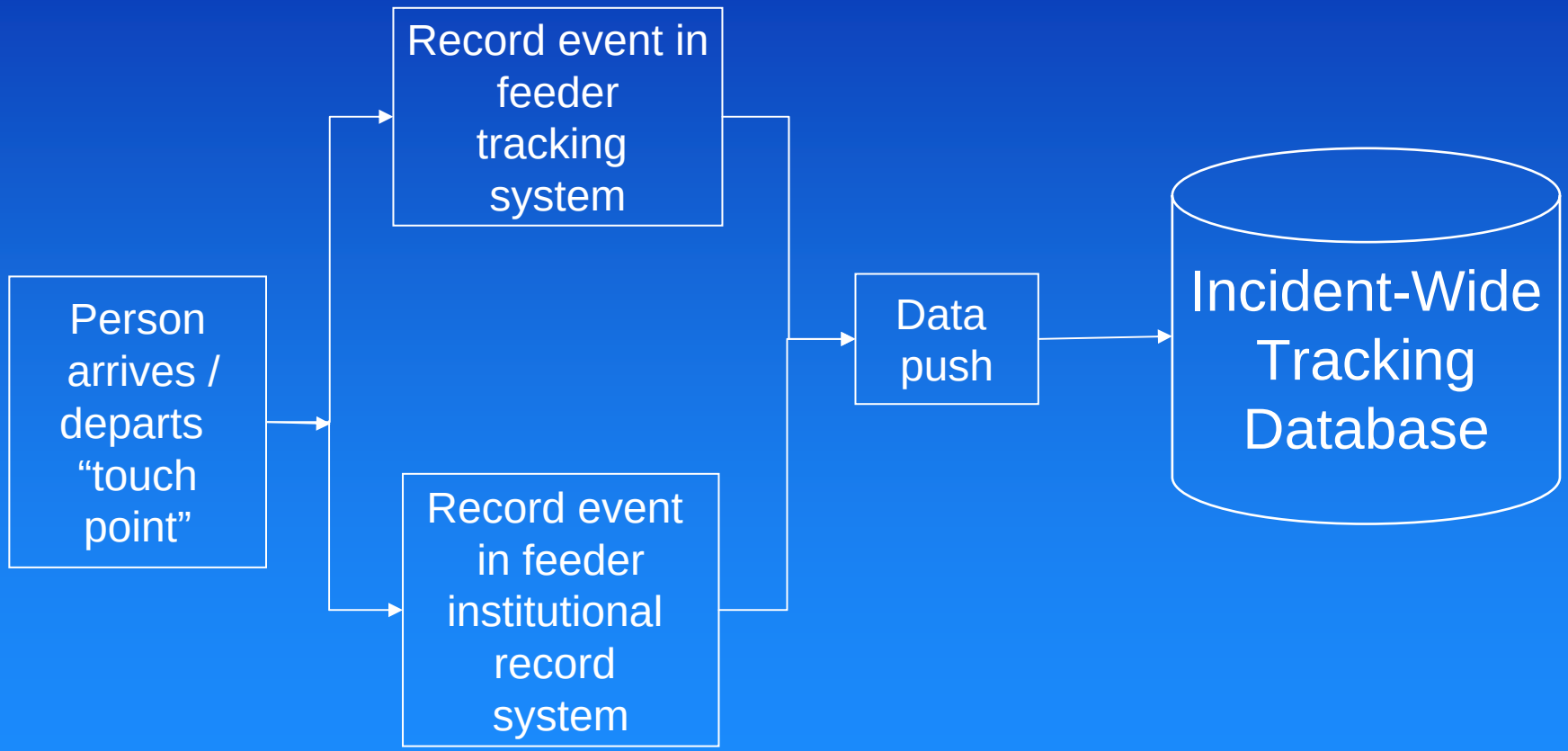


Illustration of Feeder System and National System Integration

Event	Data Flow	
1. Casualty triaged at the incident scene	Patient logged into feeder tracking system, which pushes minimum data elements to the National System	
2. Patient arrives at hospital 1	Patient arrival recorded in feeder tracking system, which pushes updated minimum data elements to the National System.	Patient arrival recorded in hospital information system, which pushes updated minimum data elements to the National System.

Illustration of Feeder System and National System Integration

Event	Data Flow	
3. Patient leaves hospital 1, bound for airport 1	Patient departure recorded in feeder tracking system, which pushes updated minimum data elements to the National System.	Patient departure recorded in hospital information system, which pushes updated minimum data elements (and possibly additional medical data) to the National System.

Illustration of Feeder System and National System Integration

Event	Data Flow	
4. Patient arrives at airport 1; boards airplane; arrives at airport 2; boards ambulance bound for hospital 2	Patient airport arrival, plane boarding, plane deplaning, and departure from airport 2 recorded in feeder tracking system, which pushes updated minimum data elements to the National System	
5. Patient arrives at hospital 2	Patient arrival recorded in feeder tracking system, which pushes updated minimum data elements to the National System.	Patient logged into hospital information system, which pushes patient arrival and updated minimum data elements to the National System, and downloads detailed patient data.

Regulating (Matching Supply with Demand)

- Outputs of the National System should be formatted to be compatible with supply assets whenever possible
- Consider using both baseline (static inventory) and current resource availability levels
- Resource availability data on a wide range of resources (beds, transportation assets, medical personnel, and medical equipment) resources could be valuable for movement and regulating decisions
- Build on existing systems as much as possible

Resource Availability in the National System: Options

Resource	Extant baseline capacity data	Reported availability at the "location level"	Reported availability at the "unit level"
Hospital Med / Surg Beds	Hospital X has 400 licensed beds	Hospital X has 10 beds available now (40 within 24 hours)	In Hospital X, the rooms with available beds are 100W, 202S, …
Ambulances	XYZ Ambulance Co. has 60 ambulances	XYZ Ambulance Co. has 6 ambulances available now	Available ambulances are #s 22, 23, …
Buses	Bus Co. Z owns 400 buses	Bus Co. Z has 20 buses available now	Available buses are #s 101, 102, …

Illustrative Use: Comparing Number of Casualties to Hospital Bed Availability

Location of Casualties	Total	Red	Yellow	Green
Incident Site	800	400	350	50
+ Casualty Collection Points	1,500	750	500	250
+ Hospitals	1,750	1,500	100	150

Pick Resource: Hospital Beds	Baseline Capacity	Reported Availability		
Pick Area: Affected Area		Current	24 Hour	72 Hour
Adult ICU	150	5	10	45
Medical Surgical	3,000	150	800	1500
Burn	45	2	5	15
….	…	…	…	…

Illustrative Use: Comparing Number of Evacuees to Shelter Bed Availability

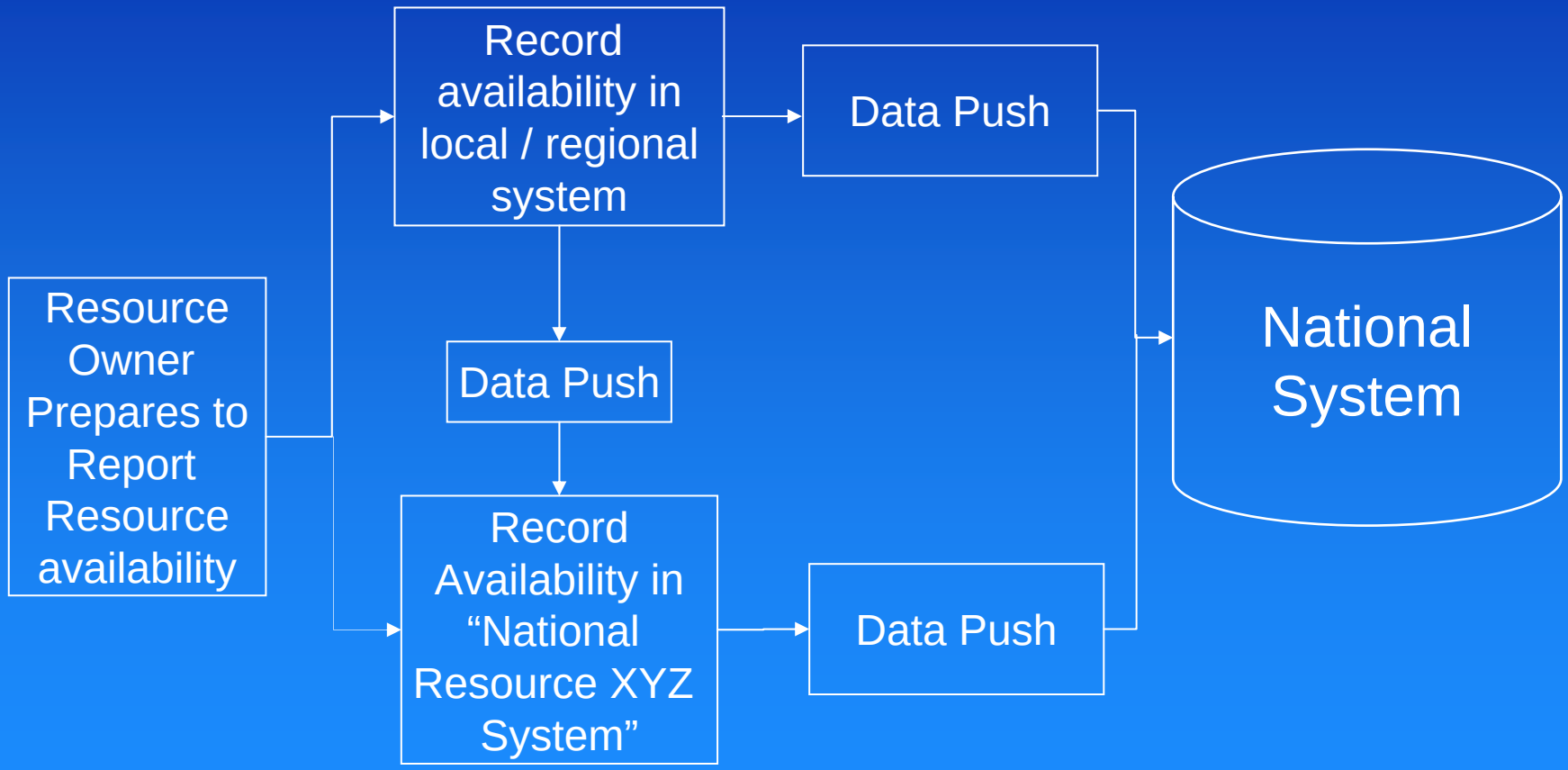
Evacuees	Total	acutely ill	well w/ medical conditions	healthy
+ Gathering Points	5,000	100	480	4,420

Pick Resource: Shelter Beds **Pick Area**: Entire State and Adjacent States	Baseline Capacity	Reported Availability
+ State 1	40,000	36,000
+ County 1	2,000	1,250
+ County 2	3,000	800
…	…	…
……	…	…

Existing Resource Data and Systems

- Examples of extant baseline capacity data
  - AHA Database
  - OSCAR Nursing Home Database
  - National Shelter System
- Local or regional resource inventory / availability systems
  - Commercial
  - Non-Commercial
- National resource availability systems
  - HAvBED

Integration Between Existing Resource Systems and the National System



Criteria for a Resource's Role in the Implementation Plan

- Value of information for patient/evacuee movement, resource allocation, and incident management
- Has resource been typed?
- Do accurate baseline data exist?
- Do system and procedures exist (and are actually followed) for obtaining current inventory levels?

Implementation Plan: Key Principles

- Need phased approach with short term success (e.g., tracking a subset of patients and evacuees at a subset of touch points)
- Consider likelihood that a particular “feeder” system will be used when the National System is activated (geographic focus to implementation plan)
- Integration with existing systems would obviate need to enter additional data, but achieving this could take a long time
- Take advantage of existing large scale systems and vendors with large installed bases

Key Recommendations

- Start with a Phase I system that is a platform for future growth
- Obtain patient / evacuee location and health status data from existing “feeder” systems
  - “Check in / check out” systems
  - Local or agency-specific patient tracking systems
- Feeder systems only provide these data if the National System is “activated”

Phase I System

- For tracking, link a limited number of feeder systems
  - Federal tracking systems (if available)
  - Disaster shelter registration systems (voluntary)
  - Admission / discharge system for a major hospital system affiliated with large health IT vendor
- For regulating, provide baseline inventory information on a small number of key resources
  - Beds (all hospitals, nursing homes, shelters)
  - Transportation assets from major owners (ambulances, buses, airplanes, trains)

Phase I Supply Assets

- Baseline inventories of:
  - Beds
    - Hospitals
    - Nursing homes
    - Shelters
  - Transportation assets
    - Ambulances (ground and air)
    - Buses
    - Airplanes
    - Trains

Focus of Subsequent Phases

- Link as many feeder systems as possible
  - Take advantage of highly concentrated health IT market
  - Focus on facilities in high risk geographic areas
- Improve quality of health care and transportation resource availability data
  - Near real-time availability, rather than baseline inventory
  - All owners, not just major owners
  - Include additional resources

Supporting Projects

- Focused on planning, rather than response
- Modeling for resource requirements to guide plans

Resource Requirement Models

- AHRQ Surge Model
  - Estimates hospital resources needed to treat casualties from ten different WMD scenarios
- AHRQ Mass Evacuation Transportation Model
  - Estimates transportation resources needed to evacuate patients from healthcare facilities

Mass Evacuation Transportation Planning Model

- Purpose of the model
  - Estimate total transportation and other assets needed to evacuate P/Es
  - Estimate required Federal assets needed to supplement local assets
- Inputs
  - Facilities to be evacuated
  - Patient / evacuee acuity and mobility
  - Location and capacity of receiving facilities
  - Available vehicles and staff to carry out evacuation

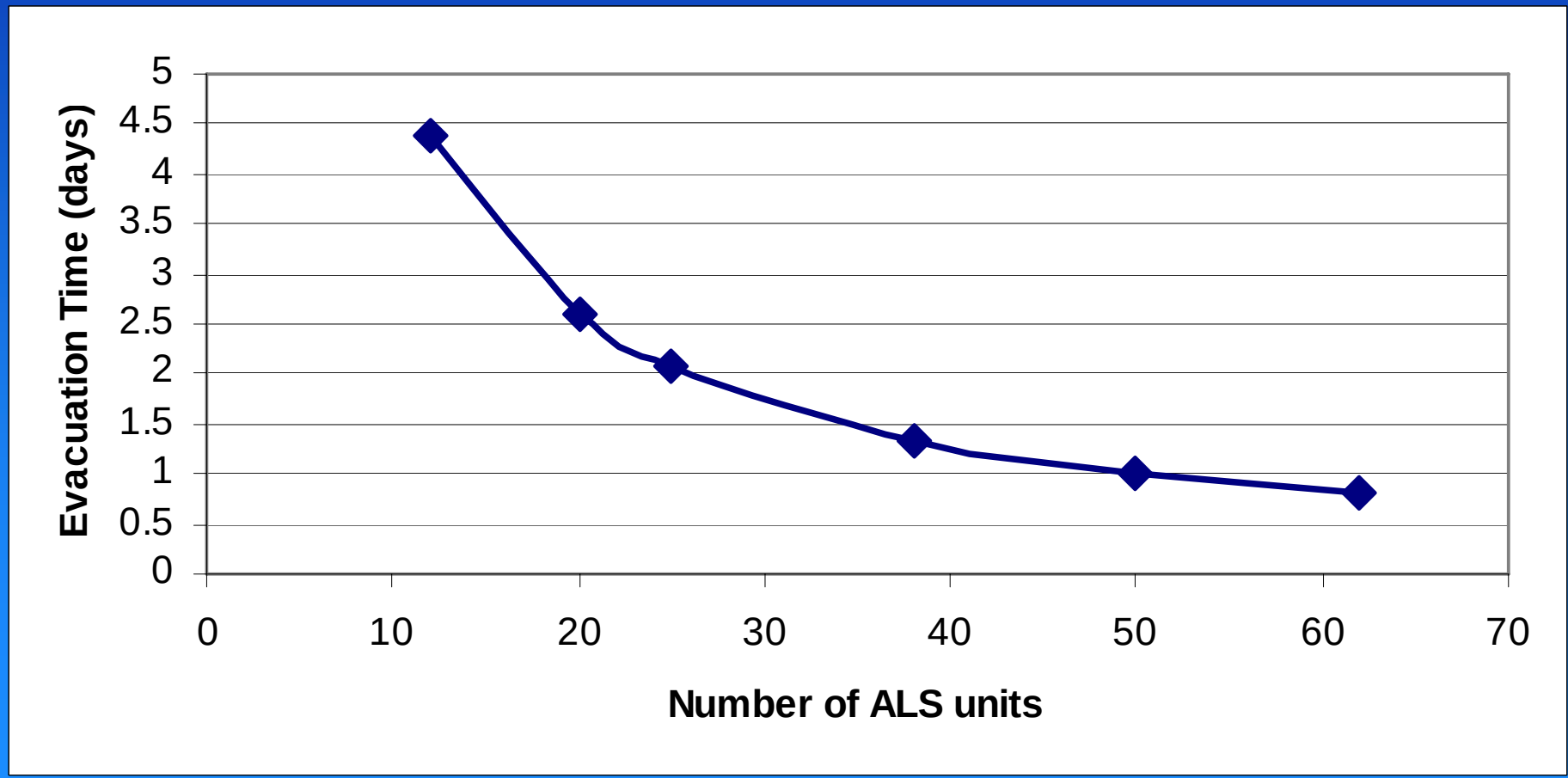
Pilot Tests of the Model

- New York City
  - NYC OEM: Commissioner Joseph Bruno, (former) Deputy Commissioner Edward Gabriel
- Los Angeles
  - LA EPD: (former) General Manager Ellis Stanley, Project Leader Chris Ipsen

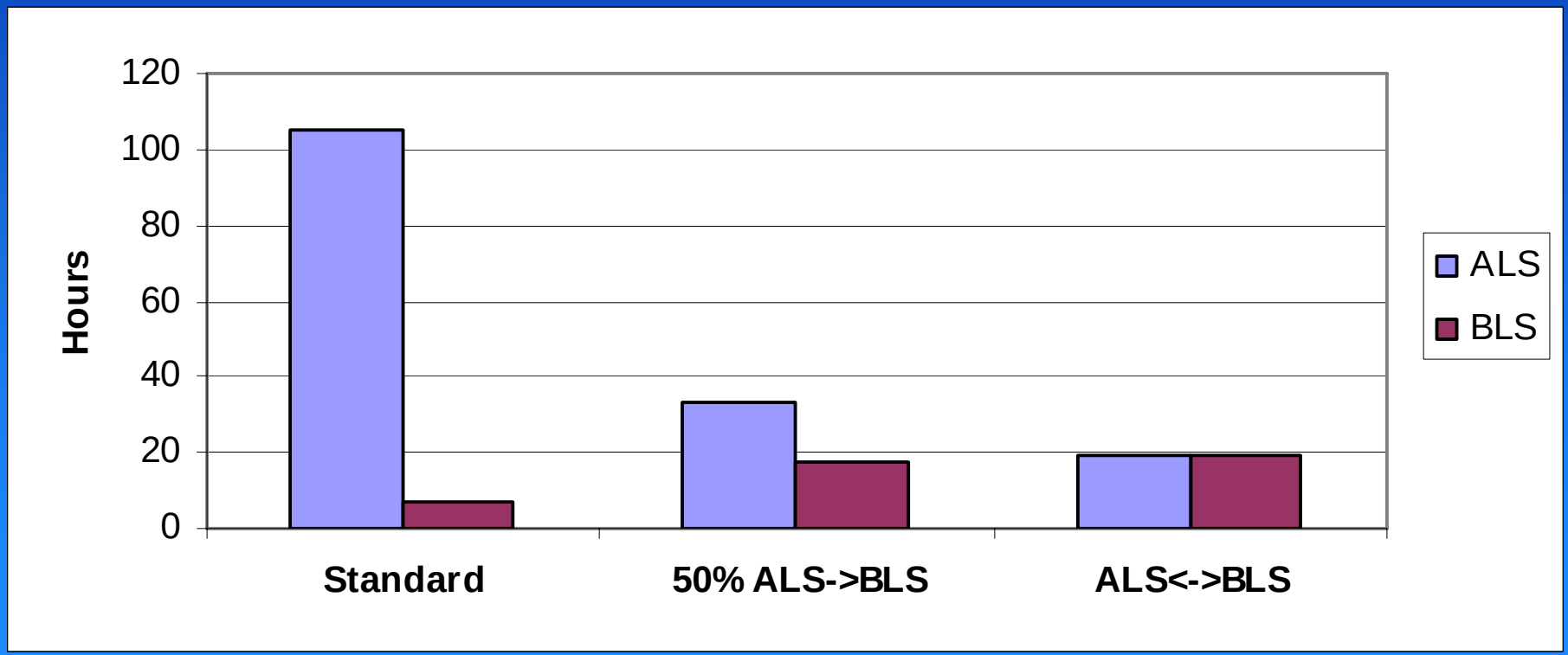
Model Pilot Tests

- New York City (April 2006)
  - Category 4 hurricane
  - Evacuation of 24 hospitals and 61 nursing homes in coastal areas (approximately 24,000 patients)
  - Planned evacuation (72 hours notice)
- Los Angeles (May 2007)
  - Major earthquake
  - Evacuation of 3 hospitals (900 patients)

Illustrative Model Output: Changes to ALS Availability (Los Angeles)



Illustrative Model Output: Changes to Standard of Care (Los Angeles)



Questions?