

December 9, 2005

**Integrated Patient Tracking Initiative
Phase I: Requirements Definition Proposal**

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TABLE OF CONTENTS

Overview	3
Project Description	5
Purpose and Objectives	6
Project Assumptions and Goals	7
Methodology	9
Results	10
Summary	12
Appendix A: General, Functional and Technical Requirements	13
Appendix B: Glossary of Terms	24
Appendix C: Acknowledgements	27

Overview

The recent Gulf Coast hurricanes and other emergency events continue to confirm that the United States faces a legitimate threat of intentional and natural mass casualty incidents. In response to these threats, numerous efforts are underway at the federal, state, and local levels to strengthen America's emergency response infrastructure and ensure that the emergency response community is adequately prepared, resourced, and organized to overcome the unique challenges of mass casualty patient care. One such effort is the development or acquisition of "patient tracking systems" as a means to improve emergency response and preparedness capabilities electronically by capturing and distributing patient information to various stakeholders, such as emergency managers and local hospitals, throughout the system of care from the emergency event.

In response to this need, COMCARE and the Virginia Hospital & Healthcare Association (VHHA) launched the Integrated Patient Tracking Initiative (IPTI) bringing together a representative group of experts to develop a national framework that communities and regions can use when procuring and deploying patient tracking systems.

The Initiative is a multi-phase project with significant deliverables in each phase. This report is the result of Phase I activities which included the establishment of practitioner groups in the summer and fall of 2005 to develop consensus for national functional requirements, and then a national summit meeting in December 2005 to review the work of these groups. These groups took multi-dimensional views of practices following (a) a patient care perspective, (b) an emergency management and hospital planning perspective, and (c) a disaster services and public health perspective. The process identified "must have" requirements as well as "nice-to-have" requirements, both of which describe a new process model.

Using realistic scenarios as the basis for requirements development, the process derived a list of requirements based on the following parameters:

- Systems that perform the best during a crisis are ones that are used every day.
- Systems should be designed from the user perspective: simple to use, and improving job performance; acceptance and use will occur if systems have demonstrable daily benefits to their users.
- Systems are more likely to be installed and succeed if they serve multiple purposes for multiple organizations.
- Many disparate and very loosely connected medical entities and emergency agencies are required to

Phase I: Requirements Definition Proposal

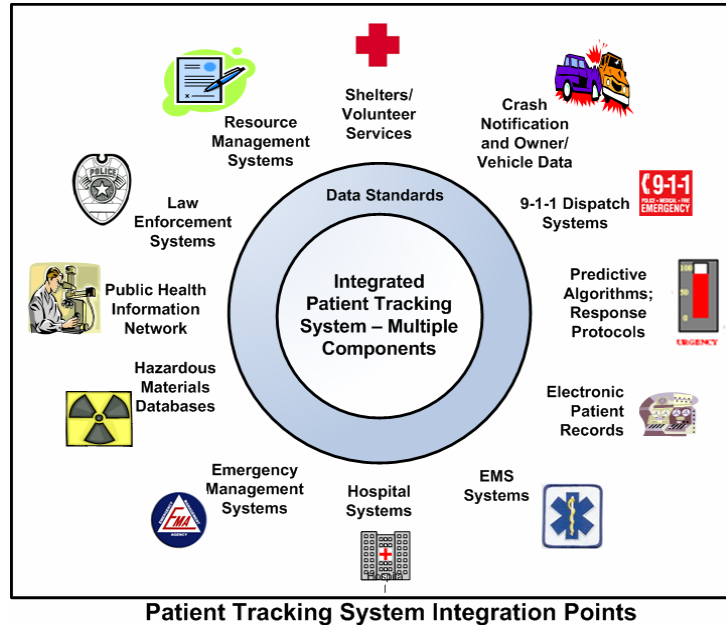
function in a coordinated fashion in order to rapidly and effectively address patient and mass casualty needs.

- Solutions must address the need to identify, triage, and track individuals and their care as they move through a community's system of care that includes medical services, emergency services, social services, and family reunification efforts.
- Many disparate organizations can be both publishers and subscribers to a patient tracking system.
- Solutions need to be standards-based and part of an open architecture to allow interoperability with legacy tools and systems of competitors.
- While the majority of emergency response efforts are local in nature, the development of the standards and architecture must be developed at the national level to ensure interoperability across disparate systems, technologies, and jurisdictional boundaries.

The project's goal is to reach national consensus among practitioner leaders from the following emergency response professions on a set of requirements for systems that ideally will meet most, if not all, of their needs.

- Fire/EMS
- Emergency Medicine/Hospitals
- Emergency Management
- Academia
- Public Health
- Disaster Services
- 9-1-1

The diagram below illustrates the diversity and number of agencies and systems with which an integrated patient tracking system must share information during a response to an emergency. Many of these systems represent stakeholder groups that told us they had information to contribute to a patient tracking system, and/or wanted information from it.



The development of a patient tracking system involves a tension between meeting the needs of one or more of these stakeholders and the others.

A draft set of requirements was submitted to a national summit in December and discussed in detail. This document reflects the work of the subcommittees and the summit participants. The requirements represent the current base requirements from which a foundation system can be deployed as well as the full system requirements representing all user needs so that system expansion can occur when the need arises.

Project Description

Members of the emergency response community are adopting patient tracking systems in an effort to improve emergency response and preparedness capabilities while keeping accurate account of the identity and location of patients and victims associated with an emergency event.

While elements or versions of these systems have been developed or acquired at all levels of government and from geographically diverse settings such as San Francisco and Kansas City, many have faced similar challenges. These include:

- Acceptance and use: identification of a system that is useful during both day-to-day and mass casualty emergency operations.
- Interoperability: integration into the community's existing portfolio of emergency application systems.
- Federal compliance: assurance that efforts are compliant with grant requirements (NIMS compliance) and federal programs or laws such as Electronic Health

Phase I: Requirements Definition Proposal

Records and HIPAA.

- Reinventing wheels: Allocations of time and resources defining requirements, RFPs, and the like that other communities have already done.
- Needs of all users: meeting the information needs of all relevant agencies from such a system, both as publishers and subscribers.
- Economics: justification of a patient tracking system investment, considering the various agency budgets that could support all or part of it due to their particular needs.

To help stakeholders through the process, COMCARE launched the Integrated Patient Tracking Initiative (IPTI), bringing together a representative group of experts to develop a national framework that communities and regions can use when beginning their own patient tracking programs. This framework includes an integrated list of requirements, best practices from previous deployments, technical solutions for data exchange and collection, a framework for interoperability with other application systems, a model Request for Proposals (RFP), and a sample deployment plan based on the peer-reviewed requirements. It is a practitioner-driven process to develop requirements and an open architecture, standards-based interoperable framework in which vendors can actively compete. IPTI will not develop or select specific products.

The Virginia Hospital & Healthcare Association (VHHA) is the lead sponsor of this initiative. It is an alliance of hospitals and health delivery systems that develops and advocates health care policy for the Commonwealth of Virginia. Its vision is to achieve excellence in both health care and health. It has 62 member health systems and hospitals, representing 95 community, psychiatric and specialty hospitals throughout Virginia.

Purpose and Objectives

The Integrated Patient Tracking Initiative takes a multi-phased approach to reaching set project milestones. The first phase is designed to rapidly develop national consensus requirements from all emergency professions that can be used when designing a patient tracking system. The second phase completes the other components of the national patient tracking framework including the development of a model RFP. The third and final phase “test drives” the framework with field trials and by following a few communities through their procurement and implementation processes. This experience will allow the project team to refine the framework for others to use.

The primary objective of this project is to provide practitioners with the tools they need to make decisions about patient tracking systems for their respective communities, and to do so in ways that enhance overall emergency data communications

Phase I: Requirements Definition Proposal

and interoperability. To that end, the project is designed to consider the following:

- All relevant prior requirements efforts and models for patient tracking systems at federal, state and local levels.
- Processes used by practitioners when responding to emergencies and then treating patients during emergency events -- whether they are mass casualty incidents or everyday emergency events such as car crashes.
- Systems and software tools used for developing and recording patient information, and how patient tracking solutions would integrate with them.
- Systems and software tools used for handling emergencies (e.g. EOC software; 9-1-1 CAD), and how patient information from these systems would integrate with a patient tracking system (both publish and subscribe).
- Best practices and lessons learned from previous patient tracking initiatives.
- National efforts to deploy the widespread use of health information technology, electronic health records, and the development of a "national health information network".
- Information technology and communications capabilities of agencies that would use patient tracking systems.
- Challenges presented by jurisdictional and geographic differences in communications (e.g. wireless dead zones in rural areas), budget (e.g. limited funds in smaller communities), and other relevant capabilities.
- Data standards, including needed data elements, message standards, and message profiles, after considering those standards already developed that can be used for these purposes whether or not they have been created specifically for this use.
- Economic value and budgetary impact of such new systems.

Project Assumptions and Goals

The project and requirements defined in this report are based on the following assumptions and goals¹:

- Systems that perform the best during a crisis are ones that are used every day.
- "Patient tracking" does not just mean tracking the physical

¹ Many of the assumptions are derived from those included in the following: Barbera J.A., Macintyre A.G. (October 2002). Medical and Health Incident Management (MaHIM) System: A Comprehensive Functional System Description for Mass Casualty Medical and Health Incident Management. Institute for Crisis, Disaster, and Risk Management, The George Washington University. Washington, D.C. Supported by a grant from the Alfred P. Sloan Foundation.

Phase I: Requirements Definition Proposal

location of the patient. Rather, it means a system which tracks the location of a patient or victim and allows for the association of some limited additional level of information regarding the condition of that individual and care given, e.g. chief complaint, disposition, medications administered, etc.

- It also means creating electronic identifying mechanisms that, beyond a simple tracking application or cross cutting data collection system, can link all sources of data about a patient in a dynamic, end-to-end continuum, crossing multiple independent databases and agency applications, from 9-1-1 through hospital discharge, and a variety of enriching data bases, protocols and algorithms along the way.
- Standardization of response parameters (vocabulary, equipment, and communications) lowers costs and improves choices.
- Political support and regular interagency interactions promote improved response and preparedness.
- Patients enter and leave the emergency system in different ways.
- Because healthcare has developed as an industry of independent practitioners, facilities and systems that have minimal need for coordination during day-to-day use, the traditional command structure utilized by the fire service, EMS and other emergency responders may not function well in a broader healthcare setting. Healthcare entities may have to be managed differently from other players in the emergency response field; however one goal of this program is to ensure that during a major incident, all such parties are willing and effective participants in an Incident Management System.
- Emergency management has developed to address all types of emergencies and disasters. The all-hazards approach of emergency management primarily denotes the use of a single set of management and response systems for all hazards (the same systems for communication, notification, management methods, etc.).
- Each political jurisdiction has primary legal and political responsibility to its own citizenry such that it cannot abrogate or subrogate that responsibility to other jurisdictions, to a "region," or to a federal response agency.
- There is a lack of incentives for interoperability and sharing. To succeed, we must be able to demonstrate a clear value to each professional category of emergency practitioner, to

Phase I: Requirements Definition Proposal

lay people, and to elected officials.

- A growing set of electronic data that could be helpful in patient response resides in a large number of unrelated places.
- A fully federated patient tracking system links all the parties and their information sources in the current or potential system of response.
- The system should be active and enable two-directional communications.

Methodology

Phase I included the establishment of a broad based practitioner Working Group. Practitioners were brought together to develop consensus for national functional requirements. The broader group convened under Subcommittees to identify requirements from the following perspectives:

- Patient Care
- Emergency Management and Hospital Planning
- Disaster Services and Public Health.

The Subcommittees participated in facilitated workshops where participants walked through a number of scenarios to define current and future processes used when treating patients during a variety of emergency events, from mass casualty incidents (MCIs) to everyday emergencies.

The full Working Group then reviewed the work product, integrated the three efforts, and presented the result to the Summit participants. They discussed this document in detail and offered many amendments. The next steps will be to finalize these requirements, and then overlay them with policies and suggested nationally recognized protocols so that functional system requirements can be defined. These will then be issued as a draft consensus set of national requirements. In addition, a technical resource², knowledgeable in patient tracking systems, is being used to document the necessary technical requirements based on a data interoperability architectural framework. A supporting group of data standards experts in relevant areas is conducting a gap analysis and project plan for the development of data content, messaging and profile standards to support such systems.

The technical requirements along with the functional requirements will be distributed to a broader audience for public comment and peer review. The finalized requirements will be included in a consensus report.

² Dr. Ronald Williams from University of Virginia, School of Engineering and Applied Science, has assumed this role.

Phase I: Requirements Definition Proposal

Phase 1 activities have included:

- Establishment of the Participant Group.
- Establishment of the three working groups.
- Assessment of current processes and protocols.
- Assessment of current technology environments including systems and network capabilities.
- Visioning discussions and/or workshops to determine needs that are not satisfied by the current environment.
- Research of future trends and emerging national requirements.
- Documentation of policies and protocols that affect the patient tracking process.
- Drafting of consensus national functional requirements.
- Drafting of consensus national technical requirements.
- Identification of barriers to achieving them.
- Consultations with technology experts and vendor community.
- Circulation of draft requirements to broader practitioner, vendor and public audiences.
- Convening a national conference.

In the future they will include:

- Incorporation of feedback from the broader practitioner and vendor community.
- Finalization of national consensus functional and technical requirements and publishing them.
- Establishment of a practitioner and vendor working group for the identification, development, and/or adoption of data standards that can be used to exchange information between various legacy and new systems in the patient tracking process.
- Planning for Phase II.

Results

Requirements were divided into mandatory requirements and optional or future requirements. These requirements were then divided into two major categories: general requirements and functional requirements. In addition, there is a high-level list of technical requirements.

The purpose of the general requirements is to identify guiding principles for the system design as a whole. They relate to both the functional and technical aspects of the solution.

The functional requirements are the result of collective discussion across the wide range of emergency domains that need to share information:

- EMS
- Emergency Medicine

Phase I: Requirements Definition Proposal

- Hospitals
- Emergency Management
- 9-1-1
- Public Health
- Disaster Services/NGOs
- State and Local Agencies
- Federal Agencies
- Private Sector

The functional requirements outlined in this document follow the systems of care and are segmented into the following areas:

Triage: Information related to the initial assessment of the patient's condition.

Patient Identification: Data points collected to positively identify an individual.

Treatment: Description of the treatment administered, medications administered and related notes; use of predictive algorithms and protocols.

Location of Patient within the System: Identification of an individual's movement within the system, and the present location of the individual.

Incident Management: Data points and functions related to emergency management.

Family Reunification: Functionality related to identification of the location of individuals entered in the system.

Post Event Analysis and Reporting: Functionality related to producing reports and aggregating data for analysis.

The technical requirements pertain to the technical aspects that the system must fulfill, such as performance, reliability, and availability issues. The list included in this report is high-level. Additional detailed requirements will need to be developed.

Appendix A includes a complete list of the draft general, functional and technical requirements.

Appendix B includes a glossary of terms so that there is common understanding as to what each requirement means.

Appendix C highlights the groups that contributed to the content of this report.

Summary

There are a variety of ways in which a patient tracking system can be designed and implemented. A national consensus on suggested requirements and implementation processes would allow communities to save time and select systems that satisfy both short and long term goals, focusing on their special needs. A national patient tracking framework will help communities to obtain the most value from their patient tracking investments, comply with federal requirements and ensure coordination across a wide variety of emergency domains.

DRAFT

Appendix A: General, Functional and Technical Requirements

N.B. The requirements reflected in this appendix should be considered design elements rather than immediate functional elements. There are several different functionalities of an integrated patient tracking system, some of which have importance or relevance to different sectors of the broader emergency response, emergency management and healthcare communities. It is perhaps unreasonable to assume that any community will be able to implement a fully integrated system initially. But by following the design elements of the requirements, long-term savings and fuller integration can be realized as systems become more integrated and upgraded. COMCARE, as a membership organization, has developed these requirements through our working groups, assistance from our members, and research involving the acquisition of patient tracking systems by our members and friends (e.g. the current National Capital Region project).

General Requirements

1. Minimum General Requirements

- 1.1. The system must serve all possible emergency agency requirements that arise in day to day events and Mass Casualty Incidents (MCIs) in order to enhance use, increase amount and value of information in the system, and lower per agency and per user costs.
- 1.2. Security
 - 1.2.1. *The system must protect patient privacy in compliance with the requirements promulgated from the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and applicable state law.*
 - 1.2.2. *The system must protect critical systems in compliance with the requirements promulgated from the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and applicable state law.*
 - 1.2.3. *The system must ensure that all data usage is in compliance with the requirements promulgated from the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and applicable state law.*
- 1.3. The system must support the use of shared identity rights management, authentication, role-based access control, and other Facilitation Services.
- 1.4. The system must enable compliance with the Department of Homeland Security's National Preparedness Goal and similar national requirements. For example, the Target Capabilities List requires:

Phase I: Requirements Definition Proposal

- 1.4.1. The system must support multi-jurisdictional pre-hospital response that considers mutual aid agreements and non-traditional patient movement and transfers.
- 1.4.2. The system must provide for or support (be interoperable with) both statewide and regional interoperable patient tracking systems that allow patient tracking from a first response site to a healthcare facility, and reports disposition, and that allows data to be accessible among statewide users.
- 1.4.3. The system must only allow appropriate agencies and staff access to patient information, including locations.
- 1.4.4. The system must support pre-event MCI algorithms that provide first responders with go-no go incident access guidance based on threat.
- 1.4.5. The system shall be incorporated into each state's all-hazards disaster plan.
- 1.5. The system shall allow for the incorporation of forms / reports required by the jurisdiction in order to meet specific documentation and reporting requirements, including federal requirements.
- 1.6. The system shall allow for a front-end graphical user interface that supports multiple views/ user interfaces that are adaptable and can be customized based on user needs.
- 1.7. The system shall support an open architecture to allow for multiple data inputs from and outputs to devices, applications, systems and databases developed by third parties.
- 1.8. The system shall have the capacity to assign an incident-specific unique number to each patient and event and provide the ability to associate this number with other identification numbers such as Social Security Number, Driver's License Number, Pre-Hospital Patient Care Report or Medical Record Number, Encounter Number and Triage Tag Number, and with other identifying information. It shall:
 - 1.8.1. Provide the ability to print tags, labels or equivalent hard copy media in the field.
 - 1.8.2. Provide the ability to query on any patient identification numbers, or combination of identifying characteristics.
 - 1.8.3. Allow numbers to be joined if a patient has been assigned more than one number because of user/system error or any other reason.
 - 1.8.4. Provide the ability to semi-automate data entry by utilizing barcodes, RFID tags or equivalent.
 - 1.8.5. Provide the ability to automate data entry by using standardized data feeds from medical devices and databases.
 - 1.8.6. Provide the ability to users to transfer information about the patient from agencies involved in patient response before them (e.g. EMS from 9-1-1; hospitals from EMS; Red Cross from hospitals). Provide users the ability to query external databases for information about the patient. The system shall support a bi-directional interface to external systems to allow the retrieval of elements of prior medical history

Phase I: Requirements Definition Proposal

and/or treatment information and its incorporation into the patient's tracking medical record.

- 1.8.7. Provide the ability to allow multiple records for patients, which are linked to the identification number.
- 1.9. Patient location and movement history should be available near real-time in the system.
- 1.10. The system shall provide the same functionality of current triage tags. As part of this functionality, the system shall be designed to include the ability to record limited medical information about the patient. It should be designed to be able to document triage status and history and treatments given in the field including medications administered.
- 1.11. The system shall provide the ability to export data to external systems using an interface to a standardized message set and profile.
- 1.12. The system shall provide the ability to generate reports in near real-time. Users need to be able to easily define the content and presentation of reports.
- 1.13. The system shall provide an inherent query capability that includes a multi-dimensional search.

2. General Data Requirements

- 2.1. The system shall interoperate with standardized data sets and messages, such as NEMESIS, HL-7 and other applicable standards.
- 2.2. The system shall ensure automatic data survivability through redundant means.
- 2.3. The system shall provide the ability to update all data fields. Updates shall only be performed by those having the authority to do so. A log of all changes shall be included so that changes to data fields can be tracked and audited. Details in the log shall include date of change, time of change, person or system making the change, before image and after image of change. This change control process is intended to provide evidence that can be used to trace transactions and verify their validity and accuracy.
- 2.4. The system shall support the ability to capture data locally and synchronize data when access to the application system is available.
- 2.5. The system shall support the ability to acquire data from multiple sources.
- 2.6. The system shall support the ability to publish data to multiple destinations and types of end systems.
- 2.7. The system will provide the ability to eliminate redundant entry of data.
 - 2.7.1. The system should pre-populate fields when completing an individual patient / victim record. These fields should be editable and auditable.
- 2.8. The system shall internally record time, location and user ID for each data entry and update the system.

- 2.9. The system shall allow for the invocation of predictive and treatment algorithms through an interface based on business rules (i.e. kinds or combinations of patient data) established by users.

Functional Requirements

3. Triage

The requirements in this section pertain to the identification and initial assessment of a new patient within the system.

- 3.1. Data collection about a patient should start and continue at whatever point data is first available. The system shall support the entry of new patients at the first time that an organization on the system becomes aware of the patient. This includes 9-1-1 calls, information at the scene of an incident, and from locations remote to the incident, whether designated prior to the incident or established in response to the event.
- 3.2. The entry of a patient into the system shall create a new patient record, which will associate all patient identifiers, triage status, treatment indicators, and location information with the individual and the event(s).
- 3.3. The system shall allow the user to at a minimum assign a unique patient identifier and enter an initial medical assessment of the status of the individual.
- 3.4. The system shall support the initial medical assessment using a color-coded system and/or a number-based system.
 - 3.4.1. Triage Status
 - Initial and updated Medical Evaluation using either a color-based or number-based system
 - It shall allow for multiple histories/dispositions
 - 3.4.2. Chief Complaint and other Complaints, and Primary Provider Impression
 - Symptoms or chief complaints of the patient, as related to area of the body, severity and categories, should be compliant with NEMSIS, including:
 - Trauma
 - Medical
 - Chronic Medical Conditions
 - Comments/Notes
 - 3.4.3. Transportation Information
 - The system shall allow for entry of multiple transportation events
 - Transporting Agency/Unit
 - Destination
 - Time of Departure

- Time of Arrival
- 3.5. Fields identified within this section should be updateable and the entry history recorded and retrievable.
- 3.6. The system should allow for the collection of the total numbers of patients and the numbers of each triage level, or any other selected field (e.g. chief complaint) for initial assessment of the severity of the incident or other purposes.

4. Patient Identification

The following information elements should be included as primary identifying elements of an individual patient. They may be collected at various stages in the process and are added to the existing patient record created when the patient was entered into the system. Information may be added to the individual's record as more information becomes available. A critical need of the system is to sort through a variety of identifiers and coalesce them on a single person and assign him/her an identification number (or likely choices) that can be used to track the patient across different applications.

- 4.1. All relevant data collected as identification of a patient should be compatible with NEMESIS including:
 - Patient Unique Identification Number
 - Other identification numbers
 - Drivers license
 - Social security
 - Others according to local requirements
 - Incident/ Event number(s)
 - Sex
 - Age (broken down according to months, days, years)
 - Date of Birth
 - Weight
 - Hair Color
 - Eye Color
 - Name
 - Aliases
 - Address, City, State
 - Phone Number(s)
 - Incident name (e.g. Southwest Mall explosion)
 - Incident number
 - Incident Location (i.e. when patient is entered away from scene, or when multiple incidents have occurred) supported by both GIS and manual location entry
 - Location of first encounter with system (i.e. when and where patient was entered into the system) supported by both GIS and manual location entry
 - Photograph
 - Race / Ethnicity
 - Blood Type

Phase I: Requirements Definition Proposal

- Parent / Guardian / Next of Kin Contact Information (Phone number, Address)
 - Personal belongings with the individual
 - Relation to nearby victims (if any)
 - Identifying marks on the patient
 - Biometrics data including eye scan, fingerprints, etc.
 - Occupation
 - Industry
- 4.1.1. The system shall allow the user the capability to add unlimited user defined data elements related to the identification of the individual.
- 4.2. The system shall associate the current location of the individual within the system to the patient identification.
- 4.3. The data elements within this section should be able to be aggregated and displayed or exported apart from any medical information associated with the individual for the purposed of identifying the exact location of the individual at a given time.
- 4.4. The system shall allow for patient records to be sorted and retrieved based on any of the data elements associated with an individual's record.
- 4.5. The system shall support the capability to pre-populate patient identification fields from others databases and systems, including Health Information Systems.

5. Treatment and Assessment

This section describes the functionality associated with the treatment administered to a patient. A patient tracking system may choose to incorporate this kind of information within itself, or may simply provide the identifying connector to the patient so agencies treating the patient may bring into their data records other relevant information about the patient. This should include standardized data fields such as patient vital signs, patient medical history, treatment administered, medications administered, and provider information. All details on the treatment administered are added to the existing patient record first created when the patient was entered into the system, or this new incident affecting them has activated a new record about them.

- 5.1. The system shall provide for entry of or access to the following pertaining to the condition of the patient and shall utilize data fields recognized in NEMSIS.
- 5.1.1. Vital Signs
- Time of assessment
 - Pulse
 - Blood Pressure
 - Qualitative Perfusion Assessment
 - Capillary Refill
 - Skin color, temperature, condition
 - Pupils
 - Respiration rate and quality
 - Level of Consciousness (GCS)

Phase I: Requirements Definition Proposal

- Trauma Score
 - Cardiac rhythm interpretation
 - Pulse Oximetry
 - Capnography
 - Glucometry
 - Lung Sounds
- 5.1.2. Medical History
- Medications
 - Medical Problems/conditions
 - Allergies
- 5.2. The system shall provide the ability to track treatment, wherever it is provided, along with the time administered and the provider, either within the application or through integration of disparate databases. The types of treatment that may be administered are identified in NEMSIS, and should be included as pre-defined fields.
- Examples Include:
- 5.2.1. Treatment Record
- BVM
 - ET
 - Oxygen
 - Bleeding Control
 - Extremity immobilization
 - Spinal Immobilization
 - IV started
 - Hazardous Materials Decontamination/Decontamination Status
 - Medications Administered
 - Cardiac Electrotherapy
- 5.3. The system shall provide for the identification of the care provider.
- 5.3.1. The system shall support the Department of Homeland Security's credentialing guidelines when they are made available.
- 5.3.2. The system shall record and track date, time and ID (e.g. initials) of clinician with each electronic chart note or entry.
- 5.3.3. The system shall identify the level of care provided.
- 5.3.4. The system shall support the identification of the level of credentials of the care provider (e.g. ALS, BLS, EMT-P, RN, MD, etc) and specialization.
- 5.3.5. The system shall internally link the provider to the organization to which he/she is affiliated for the event and to the license number and licensing state/organization.
- 5.3.6. The system shall provide the ability to assign same provider to multiple patients in a single step (triage multiple patients at once).
- 5.3.7. The system shall provide the ability to assign multiple providers to a patient.
- 5.4. The system shall provide for details on location where treatment was administered.

- 5.5. The system shall provide for the definition of flexible care locations (e.g. mass care locations) and the ability to assign a patient to such a location.

6. Location of Patient within the System

An important purpose of a patient tracking system is to identify the location of an individual related to a specific incident or event. Details on the location of the patient are added to the existing patient record created when the patient was entered into the system.

6.1. Location Information

- 6.1.1. The system shall provide for the selection of location from a pre-identified list of facilities/points of care.
- 6.1.2. The system shall allow for the entry of new locations in near real-time.
- 6.1.3. The system shall support the geospatial location of an individual within the system.
- 6.1.4. When GPS or other equivalent technology is available, location and timestamp should be automatically updated.

6.2. Patient Location

- 6.2.1. The system shall identify the entry point into the system, i.e. when the patient record is established.
- 6.2.2. It shall provide a timestamp at both start and endpoint of patient care from a specific group with each individual's movement indicated in the system.
- 6.2.3. The system shall require the receiving facility/organization to update the patient's record with the new location when the individual is received at that location.
- 6.2.4. The system shall allow the originating facility/organization to indicate the transfer of the individual to the receiving location as a verification of transfer of the individual.
- 6.2.5. The system shall identify when a patient is discharged, by whom, the conditions of discharge, and the condition of the individual upon discharge.
- 6.2.6. The system shall provide for the ability to query for an individual's current location based on the patient identifiers.
- 6.2.7. The system shall support near real-time reporting on the distribution of patients across the system including the total numbers, chief complaints, and assessment levels of patients at each facility, including alternative and temporary facilities.

7. Incident Management

Phase I: Requirements Definition Proposal

An electronic patient tracking system should support the management of the incident. Through the use of data standards, information from an event can be shared in near real-time with other systems, including emergency management and bed availability tools. The availability of aggregate data from the patient tracking system can aid in treatment of victims, management of hospital beds, management of transport units, and resource management.

7.1. Number of Victims

- 7.1.1. The system shall allow for users to share information with other users /responders on the potential and actual numbers of victims and types of injuries throughout an event.
- 7.1.2. The system shall allow for entry of casualty estimates during the early stages of an event before patients have been initially entered into the system. The system should be able to use the data acquired during the incident to prompt for an update of estimate.
- 7.1.3. The system shall identify the distribution of patients across the treatment area, be it local, regional, or country-wide, by location, by facility and by severity of injury.

7.2. Resource Management

- 7.2.1. The system shall have the ability to interface based on standards to other emergency management and response tools and systems for messaging and exchange of pertinent information.
- 7.2.2. The system should support the use of data from the patient tracking system with data from external applications or algorithms that calculate:
 - Shelter needs/ capacity
 - Types of transportation needed
 - Bed availability
 - The number of transportation units available and in use
 - The number of care providers tied to an incident and generate reports according to the levels of certification and the relation of the number of care providers per level of certification versus the number of patients
 - The number of patients of a given type (e.g. burn) versus the number of beds available

8. Family Reunification

The system shall provide for public access or access by organizations such as the Red Cross to selected information about individuals within the system in order to facilitate the reunification of individuals with families.

- 8.1. The system shall support the release of general information on an individual within the system upon approval from an authorized user of the system, or the individual.
- 8.2. The system shall support the distribution of photographs of individuals within the system.
- 8.3. The system shall prohibit the distribution of medical information, information regarding treatment administered, and any other such

information deemed sensitive in accordance with HIPAA and other state and federal laws. It shall implement other local or regional policies using a shared rights management facilitation service (see Section 1).

9. Post-Event Analysis and Reporting

- 9.1. The system shall provide for the ability to summarize incident data in support of emergency management and post-event analysis, for all data collected in the system.
- 9.2. The system, directly or through the unifying capability of identification of patients, shall provide the ability to generate such reports and analysis in near real-time, including but not limited to the following:
 - End to end response measurements
 - Outcomes analysis
 - Pre-hospital/emergency medical services on scene patient triage, treatment, and transport data
 - Reporting to Emergency Operations Centers and designated command centers
 - Hospital bed availability
 - Patient flow from the event(s) and how they entered the system
- 9.3. The system shall provide for the ability to translate incident information into standard forms for post-event reporting.
- 9.4. The system shall support a wide variety of user defined inquiries of the entire data base, without individual identifying characteristics, for purposes of research.

Technical Requirements

10. Baseline Technical Requirements

- 10.1. The system shall allow input and output using a full range of devices and techniques. It shall not be bundled with one or a handful of specific, proprietary devices.
- 10.2. It must be agnostic to equipment used.
- 10.3. The system shall accommodate data storage by multiple means and owners.
- 10.4. The system shall be agnostic to the form of electronic transport (wireless, wire line).
- 10.5. The system shall accommodate the absence of electronic transport for periods of time (store data locally until a network connection is made).
- 10.6. The system shall be interoperable with other emergency systems and software applications of all kinds if they also use standardized interfaces and open architecture.
- 10.7. The system shall provide an open standards-based platform to be used by many users who are not centrally located.
- 10.8. The system shall be able to use shared Facilitation Services.

Phase I: Requirements Definition Proposal

- 10.9. The system shall, in addition to interfaces with specific devices, provide a Web-based portal solution for remote access and monitoring.
- 10.10. The system shall provide a Graphical User Interface that includes alerting functions such as sound or visual prompting
- 10.11. Security
- 10.11.1.* Users shall be authenticated into the system, either locally or remotely. Authentication methods deployed shall follow the OMB Guidance, E-Authentication Guidance for Federal Agencies, (OMB 04-04) that defines four levels of authentication with Level 1 being the lowest and Level 4, the highest. Levels 1 and 2 require only one level of authentication; levels 3 and 4 require two factor authentication. Three factors include: something you know (password); something you have (smartcard, token), and something you are (biometric trait). Levels 1 and 2 allow password alone or token alone, but not biometric alone. Levels 3 and 4 allow password and token or biometric and token but not password and biometric. A minimum the patient system shall support Level 2. However, certain communities may require a higher level.
- 10.11.2.* Users shall have proper authority to access certain functions and information. Access control is the means by which the ability is explicitly enabled or restricted. Role-based access control is the desired approach for the patient tracking system. This approach enables access decisions to be based the roles that individual users play. Access rights or permissions are grouped by role, and the use of resources is restricted to individuals authorized to assume the associated role. For example, within a hospital system the role of doctor can include operations to perform diagnosis, prescribe medication, and order laboratory tests; and the role of researcher can be limited to gathering anonymous clinical information for studies.
- 10.11.3.* Application access shall include a secure Web browser and 128-bit encryption.
- 10.12. The system shall provide 99.99% system availability.
- 10.13. The system shall require 24/7/365 customer and technical support.
- 10.14. The systems must be designed for future expandability.

Appendix B: Glossary of Terms

Auditable – Data captured in the system contains information about who, where and when the data was updated or created. When data is changed, previous versions are amended rather than replaced.

Amend – Update changes by adding information. New entries are in addition to older entries. Data is never deleted during the amending process.

Authentication - Security measure designed to establish the validity of a transmission, message, or originator, or a means of verifying an individual's authorization to receive specific categories of information.

Biometrics – The use of biological phenomena to identify an individual.

Chief Complaint – The patient's primary complaint. Important for statistical purposes and may not actually be the most serious medical issue.

Emergency Domain – An emergency domain is a distinctive group of agencies with a shared professional interest, such as law enforcement, fire, hospitals, etc. Domains tend to be more granular as multiple domains can make up one ESF.

Emergency Support Function (ESF) - The Emergency Support Function or "ESF" is a mechanism that consolidates multiple agencies that perform similar or like functions into a single, cohesive unit to allow for the better management of emergency response functions.

Facilitation Services - Common shared tools, services, and resources offered through a collective effort of the emergency response community.

Federated – A collection of independently managed, heterogeneous systems that allow partial and controlled sharing of data without affecting existing applications.

Geographic Information System (GIS) – A database system with software that can analyze and display data using digitized maps and tables for planning and decision-making. It can assemble, store, manipulate, and display geographically referenced data, tying this data to points, lines, and areas on a map or in a table. Any location with known latitude and longitude or other geographic grid system can be a part of a GIS.

Glasgow Coma Scale (GCS) - A scale that is used to assess the severity of a brain injury, that consists of ratings assigned to three variables depending on whether and how the patient responds to certain standard stimuli by opening the eyes, giving a verbal response, and giving a motor response.

Health Level 7 (HL-7) – Health Level Seven is one of several American National Standards Institute (ANSI) -accredited Standards Developing Organizations (SDOs) operating in the healthcare arena. Health Level Seven's domain is standards for electronic interchange of clinical, financial, and administrative information among health care oriented computer systems.

Phase I: Requirements Definition Proposal

HIPAA – The Health Insurance Portability and Accountability Act of 1996 (HIPAA) was introduced to improve portability and continuity of health insurance coverage in the group and individual markets; to combat waste, fraud, and abuse in health insurance and health care delivery; to promote the use of medical savings accounts; to improve access to long-term care services and coverage; to simplify the administration of health insurance; and for other purposes.

Incident Command System (ICS) - A standardized on-scene emergency management concept specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

Integrated – An environment where separate programs perform separate functions with communication and data-passing between functional programs performing standardized routines and using common databases.

Multidimensional Search – A system technique that allows for the retrieval of information from electronic databases by locating user-determined characteristics of the data.

National Emergency Medical Services Information System (NEMSIS) – The National EMS Information System Initiative (NEMSIS) serves to provide technical assistance for the implementation of the National Highway Traffic Safety Administration's Uniform Pre-Hospital EMS Dataset. The goal of NEMSIS is to establish an EMS data system at the local, state, and national levels.

National Incident Management System (NIMS) – NIMS integrates effective practices in emergency preparedness and response into a comprehensive national framework for incident management. The NIMS enables responders at all levels to work together more effectively to manage domestic incidents no matter what the cause, size or complexity.

National Preparedness Goal – Homeland Security Presidential Directive 8 (HSPD 8) whose purpose is to establish policies to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies by requiring a national domestic all-hazards preparedness goal, establishing mechanisms for improved delivery of Federal preparedness assistance to State and local governments, and outlining actions to strengthen preparedness capabilities of Federal, State, and local entities.

Near real-time - The delay introduced, by automated data processing or network transmission, between the occurrence of an event and the use of the processed data.

Open Architecture - An architecture of which the specifications are public. This includes officially approved standards as well as privately designed architectures the specifications of which are made public by the designers.

Patient Tracking – The ability to know, at any given time, the location and status of a patient from the time s/he is first encountered by an emergency responder at an emergency event to arrival at a facility, whether the facility is a hospital, shelter or morgue.

Phase I: Requirements Definition Proposal

Predictive Algorithm – A complex set of mathematical equations developed by a multidisciplinary team of physicians, trauma surgeons, engineers and injury statisticians to predict the probability of a serious, potentially life-threatening injury, resulting from an accident or emergency event.

Role-based access control – An authorization technique that enforces and monitors access to functions and data based on assigned roles and the permissions granted to each role. A user or organization is assigned a role with its associated permissions based on function and need to know.

System - A combination of inter-related elements comprising a unified whole.

Target Capabilities List - A framework for the development of a network of capabilities that will be available, when and where needed, to prevent, protect against, respond to, and recover from incidents of national significance.

Trauma Score, Revised Trauma Score - A physiological scoring system, with demonstrated accuracy in predicting death. It is scored from the first set of data obtained on the patient, and consists of Glasgow Coma Scale, Systolic Blood Pressure and Respiratory Rate

Unique User ID – A unique system-generated identifier that is used by a system to associate and identify a user. This number is stored in a user profile along with username, and other user-specific information such as password.

Appendix C: Acknowledgements

We thank the representatives from the following organizations for participating in the IPTI Working Group, Subcommittees, and Summit. The requirements within this document are the product of their contributions throughout the course of this Initiative.

AHRQ
Ambulance Service Association
American College of Emergency Physicians
American Heart Association
American Hospital Association
American Medical Association
APHA
Association of Air Medical Services
Association of Public Health Laboratories
ASTHO
Brain Trauma Foundation
California EMSA
Carolinas MED-1
CDC BioSense
CDC--Health Information Privacy Office
Center for Biosecurity—UPMC
Chicago Heights Fire Department
COMCARE
DC Emergency Management Agency
Department of Homeland Security
DoD
DoD (Health Affairs)
eHealth Initiative
EHMSA
Emergency Nurses Association
EMSC National Resource Center
FEMA
The George Washington University
The George Washington University Hospital
Georgetown University
HHS—Department of Public Health Emergency Preparedness
HHS/HRSA/DHP/NBHPP
HIMSS
HRSA
IAEM
IAFF
Inova Fairfax Hospital
International Association of Fire Fighters
JCAHO

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Johns Hopkins Applied Physics Lab
Joint Force Headquarters - National Capital Region
Maine EMS
Maryland Institute for Emergency Medical Services
Medical College of Virginia
Mid-America Regional Council
Minnesota Dept. of Public Health
Montgomery County EMS
Montgomery County Maryland Public Health
NACCHO
NAED
NAHDO
NASEMSD
National Academies of Emergency Dispatch
National Association of State EMS Directors
National Disaster Medical System
National Volunteer Fire Council
NEDARC
NEMA
NENA
NHTSA
Northern VA EMS Council
Northern Virginia Hospital Alliance
Office of the Surgeon General
Old Dominion EMS Alliance
Prince George's Fire/EMS Department
Red Cross
Richmond Fire & Emergency Services
Ryder Memorial Trauma Center
SafeTech Consulting
San Diego Public Health
San Mateo County EMS
Shenandoah University
Starbourne Communications
STARRS
UDCES
U.S. Fire Administration (FEMA)
UNC/NC EMS
University of Memphis
University of Virginia
University of Virginia Medical System
Valley Health System
Virginia Department of Health
VHHA Hospital Emergency Management Committee
Virginia Consolidated Laboratories
Washington Hospital Center