Emergency and Disaster Recovery System Extensions to caBIG™

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Biomedical Informatics

ca! - The Overall Project

Is it feasible to construct a highly available, low cost, environmental sensor data collection and analysis system for use in emergency situations, by utilizing existing emergency response system infrastructure, for data acquisition, and a distributed computing grid (caBIG™) [3-5] for an applications development and execution environment?

ca! Components

The conceptual model is comprised of three components:

- A sensor data acquisition component
- A sensor data aggregation and storage component
- An applications development and execution environment (caBIG™)

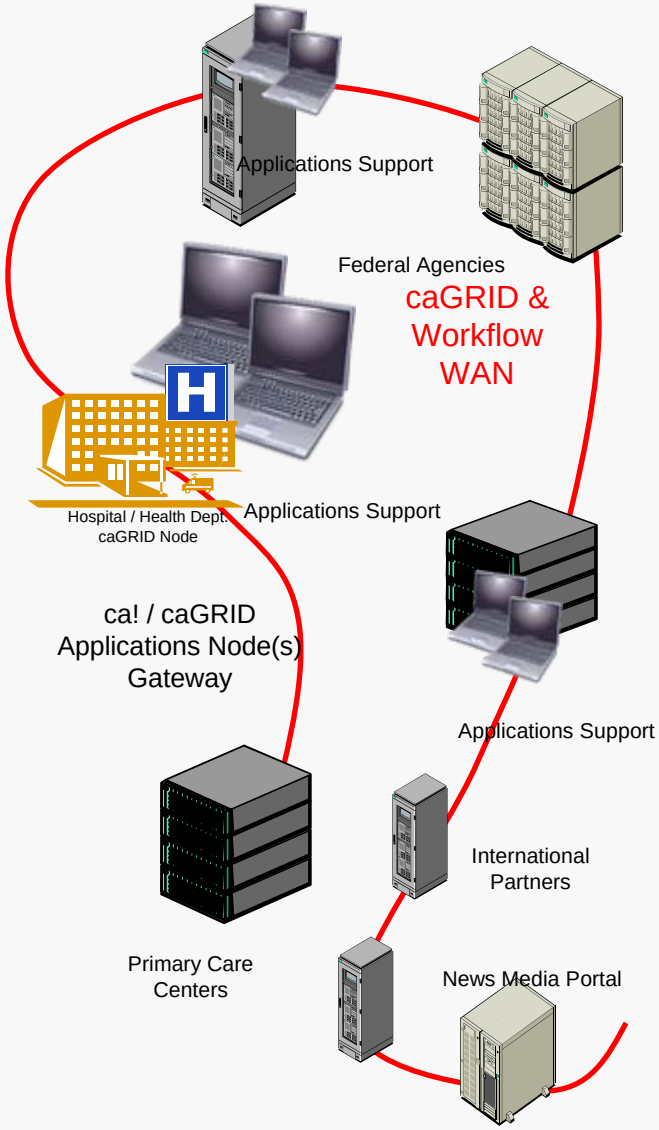
ca! - Sensor Component Criteria

- Sensors operate with no VAC, all 12DC
- Two node types, static and mobile
- Use existing equipment, laptops, in first responder vehicles
- Simple sensors, data recovered using sensor embedded web servers
- Data recovered in raw form, processed at the GRID node I/F
- Very low cost technology, small delta over existing expenditure
- Sensors connected via WI-FI and Peer to Peer networking (reliable network)

caBIG™ Architecture Background

Why Use caBIG™?:

- caBIG™ [3-5], a WAN distributed series of functional cancer research nodes accessible in a manner analogous to plugging into the power *grid* (caGRID [5]) - plug and play…
- Each node may be a single system, a cluster or a parallel system



caBIG™ Functions

- caBIG™ provides a network resource for handling desired cancer research tasks in a standardized manner
- caBIG™ provides the ability to execute tasks in a coarse grained parallel or distributed manner, caGRID / Workflow
- caBIG™ allows for data portability, both at functional and semantic levels, including vocabulary, common data elements, message passing formats and APIs
- Emphasis on cancer research, but extensible

caBIG™ Platform

- caBIG™ uses the Globus Toolkit Version 4 (GT4) [7] for underlying transport
- caBIG™ is a form of GRID computing at the broadest form of the definition, caGRID
- caBIG™ provides an SDK for developers (Cancer Applications) within the caCORE component
- GRID aware applications platform, caGRID
- caGRID provides for security and supports Workflow capabilities

caBIG™ Platform…

- What do we get with caBIG™?
  - Distributed Applications, caGrid
  - Security
  - Service Directory
  - Semantic Services, Vocabulary, Ontology
  - Resource Manager
  - Standard Query Language and Interface
  - Data Integration and Standardization
  - Software Development Environment
  - Standards and Certification

ca! - Sensor Network

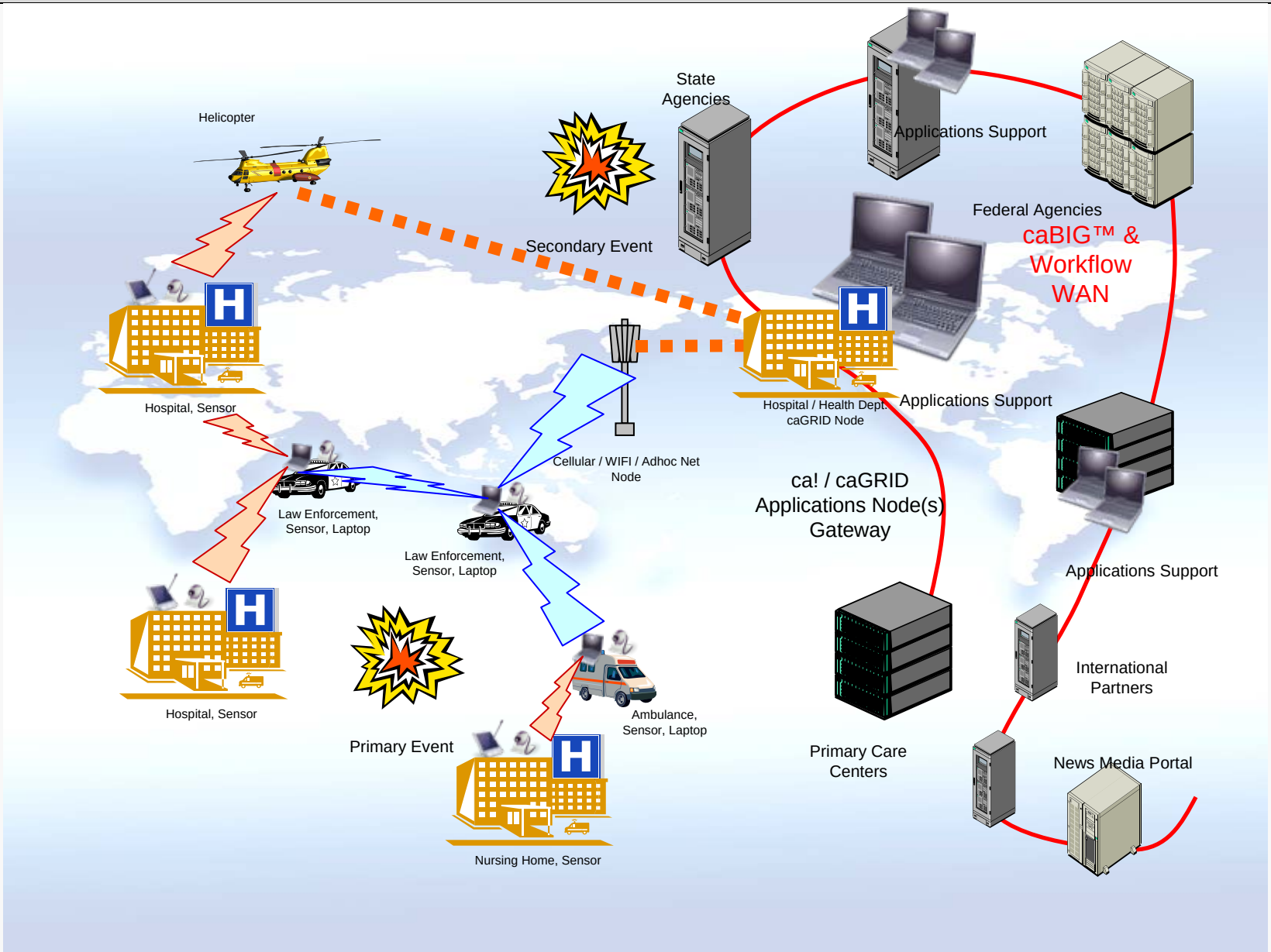
Our Task:

- Extend caBIG™ to support a dynamic mobile sensor network
- Provide a sensor abstraction to the caBIG™ GRID via the Cancer Data Standards Repository (caDSR) [6]
- Allow sensor network and processed sensor data to be visible by any authorized node on GRID
- Accommodate Three Aspects to Sensors:
  - Raw Data
  - Aggregated Data
  - Temporal Parameters

ca! - Applications Layer

- Data is visible to any authorized caBIG™ client on the GRID
- Adheres to caBIG™ standards for vocabulary and data formats, messaging and APIs
- Exploits caBIG™ security controls for sensitive information access
- Allows for remote processing of data
- Distributed data archiving
- Supports layered applications:
  - First Responder
  - State or Area Level
  - Federal or National Level

ca! - Architecture



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