

5 March 1998

Subject: The Changing Role of Military Medicine

Place: Municipal Auditorium, San Antonio, Texas

Time: Monday, 6 April, 1000-1045

Audience: Society of Air Force Surgeons (plus invitees from Wilford Hall & Brooks AH)

Precis: American military dominance has had the effect of decreasing risk of large scale, conventional conflict with attendant battle trauma, and of increasing likelihood of military interventions in destabilized societies for political and humanitarian purposes. The ramifications for the medical services of the several military departments are greater emphasis upon preventive medicine and readiness for biological warfare to support our own armed forces, coupled with preparedness to succor large groups of foreign civilians in need of medical aid to meet environmental, physiological, and psychological challenges. In most instances, these missions will entail projection of medical facilities, personnel, and skills into culturally austere regions of the world. Future information systems will constitute a highly significant asset for military medicine.

I Introduction: minimum presence/maximum impact

II The Politico-military Context

Threat Assessments

National Security Policy

Medical Implications

Evacuation Policy

Projection of medical capabilities

III Medical Readiness: Skill Projection

Preventive medicine

Biological warfare

Civic Action

IV Logistics

Water and food

Medical Facilities

Maintenance of medical equipment

Shelter, clothing, blankets

V Technology Trends

Sealift

Airlift

Containerization

Information systems

Computing

Communications

Human interfaces

VI Impediments

Sensors
Training

Military Medicine



A Changing Role

has been....will be

P.F. Gorman, San Antonio, Mar 1998



A War the U.S. Avoided

Central America 1983-1998

The Role of Military Medicine

- **Presence**
- **Public Health**
- **Tertiary Care and Teaching**
- **Field Medical Service Training**
- **Air Evacuation**
- **Medical Maintenance**
- **Veterinary Service**

1983: Edge of the Cliff

• **Nicaragua**: Mounting insurgency. Soviet/Cuban buildup. Massing in northwest; cross-border military incursions in both north and south.

• **Honduras**: Preparations for general mobilization.

• **El Salvador**: Guerillas striking in large units. Increasing government losses. Impending defeat and collapse .

— During '82, Salvadoran Army sustained 7% casualties (1300 KIA/DOW of 40k: like the U.S.' losing 65,000 in 1991). Mortality among WIA 45%.

— U.S. SOUTHCOM limited by Congress to 55 trainers/advisors. Military Assistance Program severely constrained.

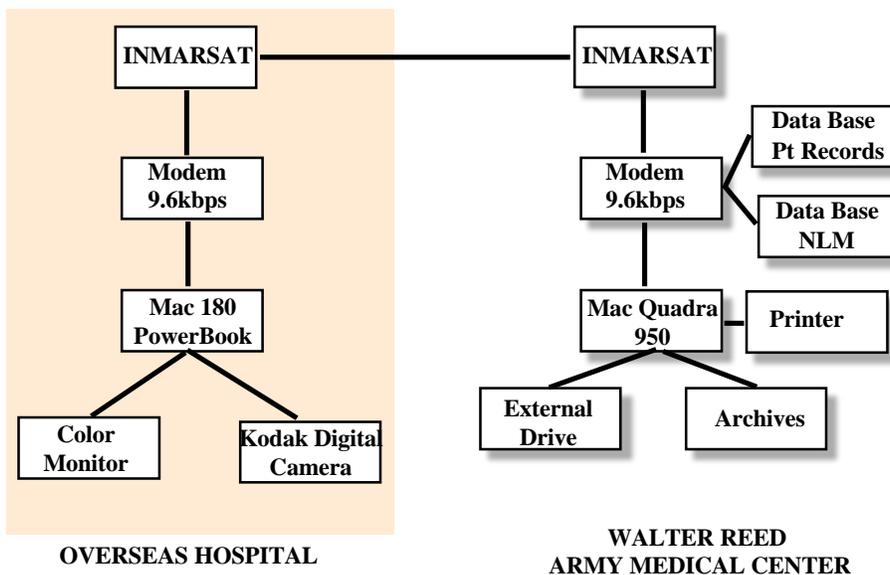
1985: A Future Restored

- During '83 and '84 US MTT trained 1391 Salvadoran medics, set up a field medical service battalion, and an air-evacuation system (dedicated HU1Hs & C-47s).*
- WIA then reached hospital within 3 hours. Mortality among WIA reduced to 5%. Morale improved.*
- Army leadership revamped. Optempo accelerated. Guerillas forced to adopt small-unit hit-and-run tactics.
- Jose Napoleon Duarte elected President. Economy revived. "You have taught us how to catch fish instead of selling us fish in cans."

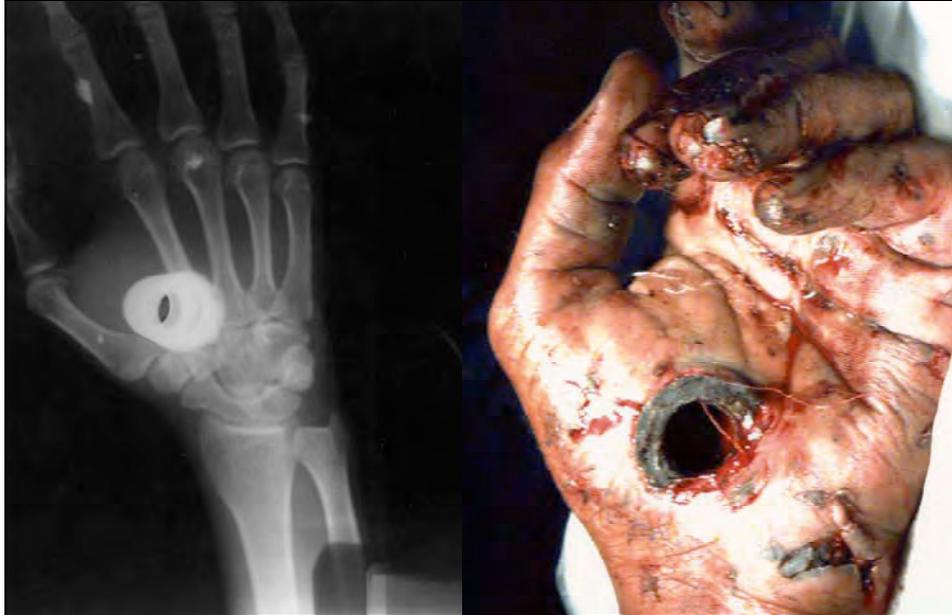
* Zajtchuk, Rumbaugh, Brown. *Military Medicine* 154. 2:059, 1989

TRANSOCEANIC TELEMEDICINE

Army's Remote Clinical Communications System 1993



40mm. Grenade Embedded Left Palm



An Era of Strategic Uncertainty

- **Downsized U.S. military forces possess unprecedented reach and striking power. But have been tasked to exert influence throughout the world, and hence must plan to do more with less. [1/3 presence in theater....]**
- **American industry is creating new capabilities to generate wealth via transmittal of goods and information**
 - Containerization for intermodal transportation
 - 40 knot container ships and airlift of 500 tons of containers per sortie
 - Extensive transcontinental cables and constellations of satellites for communication networks
- **Rogue nations, cultural and religious groups have increasingly turned to terrorism and to weapons of mass destruction to challenge American dominance and to counter American influence: an asymmetric response to U.S. power**

Computer Technology Evolution

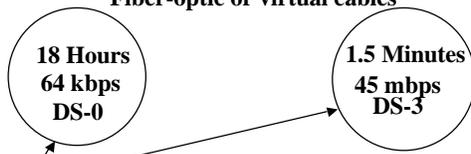
Year	Generation	Platform	Interface	Network
1998	web computers	PCs, client-server	keyboard	telephone or cable
2001	speech-controlled	hand-held	audiogenic	wireless
2010	one info dial tone	video screen	imagery as primary data	hyper-speed
2020	anticipatory	room monitors	recognition, gesture	networked places
2025	body net	artificial retina, cochlea, glasses for display, body monitors	implanted or attached sensors & actuators	human body networks on wireless www

Gordon Bell, "Beyond Moore's Law
IEEE Spectrum, June 1997

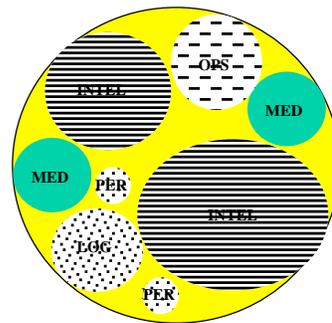
GLOBAL GRID

Pervasive High-Capacity Information Conduits

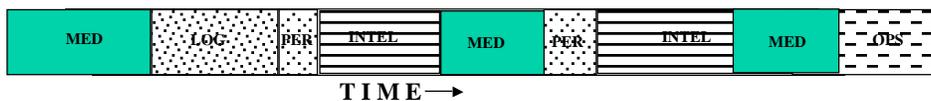
Asynchronous Transfer Mode [ATM]
Fiber-optic or virtual cables



Time to transmit overseas complete medical records for 1000 patients:



ATM switched data-stream

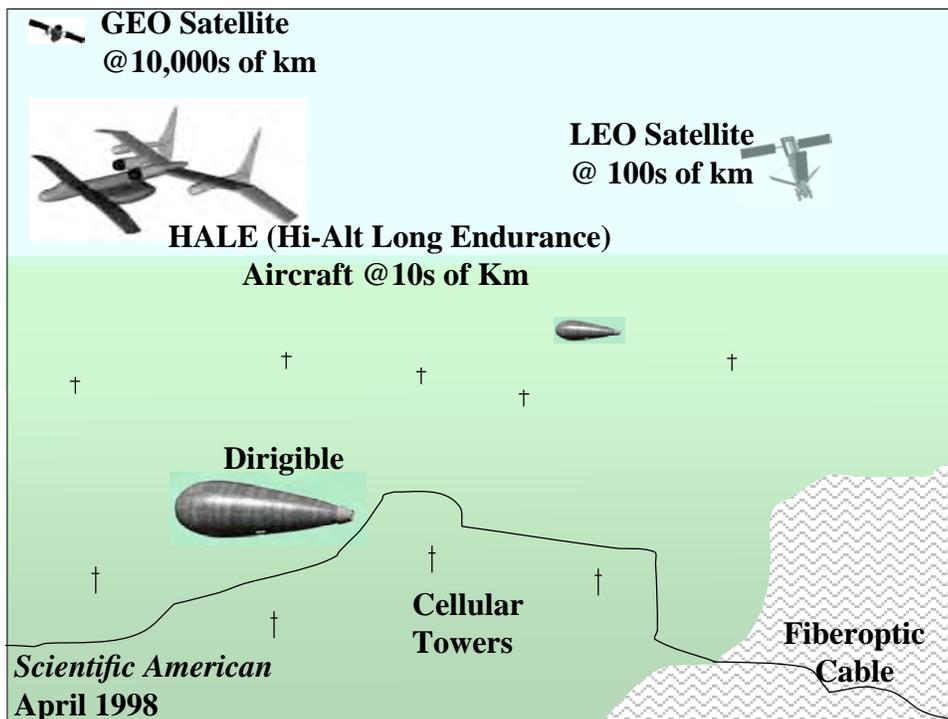


Pervasive Communications

Personal Communications Satellite Systems

	Voice-Oriented	Data-Oriented	Total
No. of Systems	5	7	12
No. Active Satellites	184	502	686
Est. Investment	\$14.31 Billion	\$38.72 Billion	\$53.03 Billion

Scientific American
April 1998



Pervasive Communications

Personal Communications Satellite Systems

“By 2000 it will be possible to call home from essentially anywhere on the planet using a handheld terminal similar to one of today’s cellular phones. For better or worse, we need never be out of touch, no matter where we are...

“Within a decade it will probably be possible to live in a remote area and yet be connected to the worlds of commerce and entertainment via the Internet and other sources of multimedia at rates high enough to support movies on demand...

Scientific American
April 1998

Biological Warfare: the Threat

- Pathogens known to have been “weaponized”

- 18 types of bacteria
- 14 toxins
- 4 rickettsiae
- 28 viruses

Airborne particulates are considered the most dangerous form of bio-weapons

- Plus eight forms of plant pathogens, and 16 forms of animal pathogens

- Plus genetically modified micro-organisms or genetic elements that contain nucleic acid sequences or coding associated with pathogenicity, and are derived from organisms on the core list.

Malcolm Dando, *Biological Warfare in the 21st Century*. Brassey’s London, 1994

Biological Terrorism

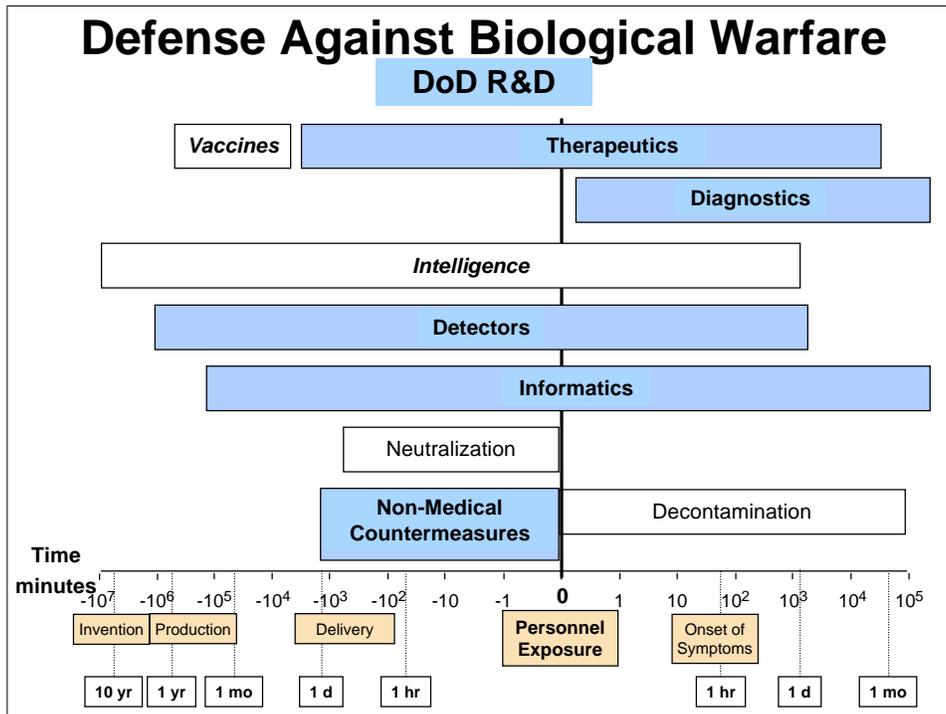
- An effective attack would probably use an airborne particle 1 to 10 microns in size, dispersed by sprayers, airburst explosives, or passing traffic, to cause widespread inhalation

- 1 cc of pulmonary anthrax agent contains $\sim 10^9$ spores; inhalation of $\sim 10^3$ spores is fatal in 95% of cases; symptoms in 24-36 hours, but by then toxicity is beyond medical intervention

- In 1979 an accidental aerosol release of dry anthrax spores from a biological weapon plant in Sverdlovsk, USSR caused 100 deaths

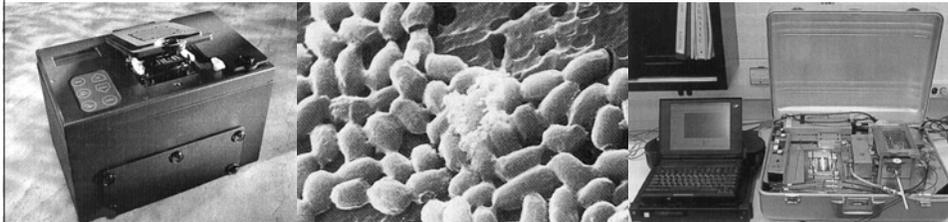
- In the mid 90's Aum Shinri Kyo cult was growing bio weapons to spread over Tokyo. 100 kg of anthrax, spread over 500 km² would have resulted in ~ 3 million deaths

- Little evidence to date of attempts to bio-engineer pathogens; rather, efforts have been directed at weaponizing anthrax, botulinum toxin, plague, tularemia, and Q fever.



R&D: Examples of Pathogenic Detectors

- Shoe-box sized, 20 lb. mass spectrometer
- Hand-held, chip-based device using up-converting phosphors
- Electronic ribosomal identification of micro-organisms
- Combinations to reduce false positives and increase confidence in identification



Fiber optic waveguide
pathogen detector

Bacillus anthracis Ames
9500x

Mass spectrometer
pathogen detector

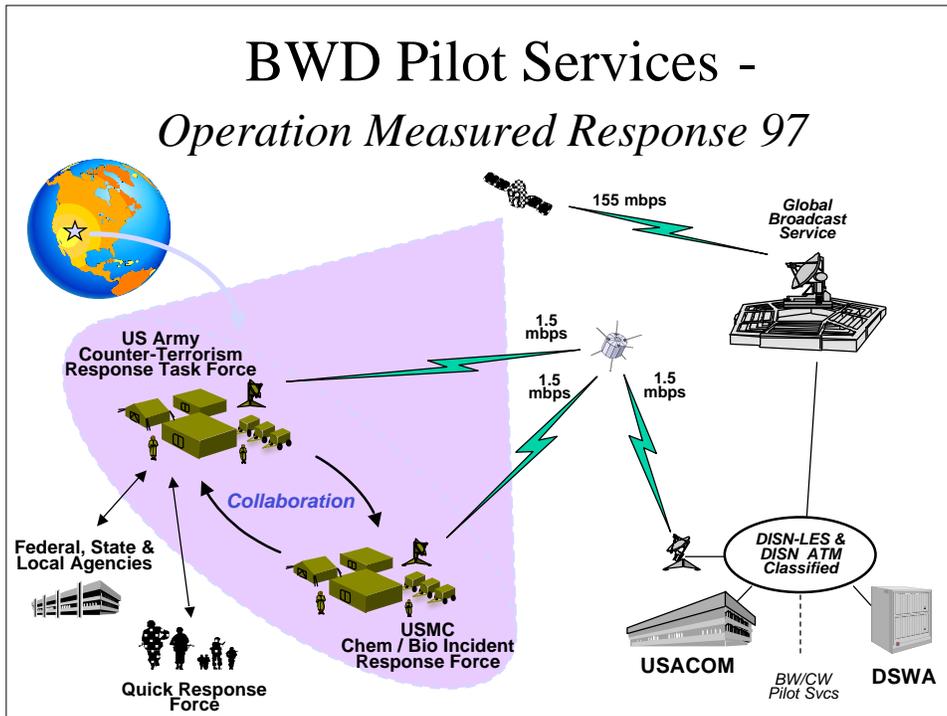
Defense Against Chem/Bio Attacks

- Prepare small mobile units to manage crisis and consequence
 - Enable proactive collaborative planning and execution
 - Exploit the available bandwidth
 - Just enough patient record
 - Rapid action — pack it in and out quickly

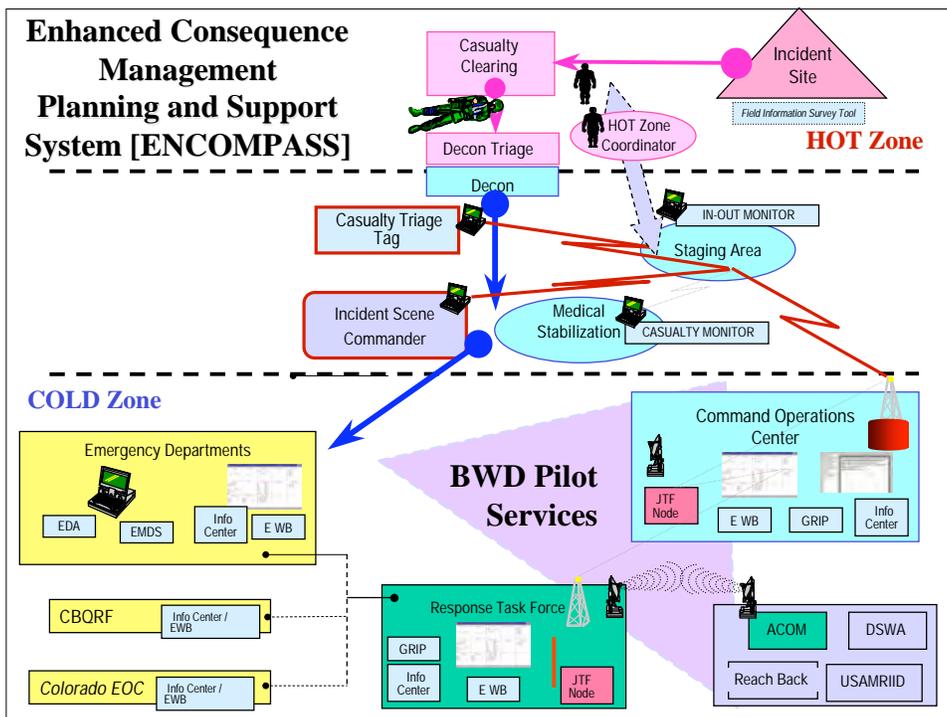
Enhanced Consequence
Management
Planning and Support
System [ENCOMPASS]

Chemical Biological
Incident Response
Force
[CBIRF]

BWD Pilot Services - Operation Measured Response 97



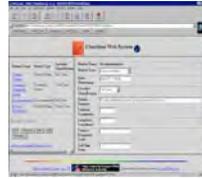
Enhanced Consequence Management Planning and Support System [ENCOMPASS]



ENCOMPASS Components



Field Incident Survey Tool



Incident



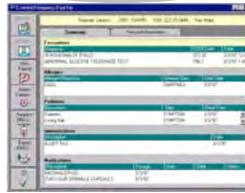
Casualty Triage Tag



Design Repository
Electronic Playbooks
Incident Repository



Global Response Incident Planner



Essential Medical Data Set



Electronic Watchboard

ELECTRONIC WATCHBOARD

Provides situational awareness to the on-scene commander. Web-based access provides the ability to communicate events to multiple sites, including Joint Operations Centers and supporting federal and local agencies.

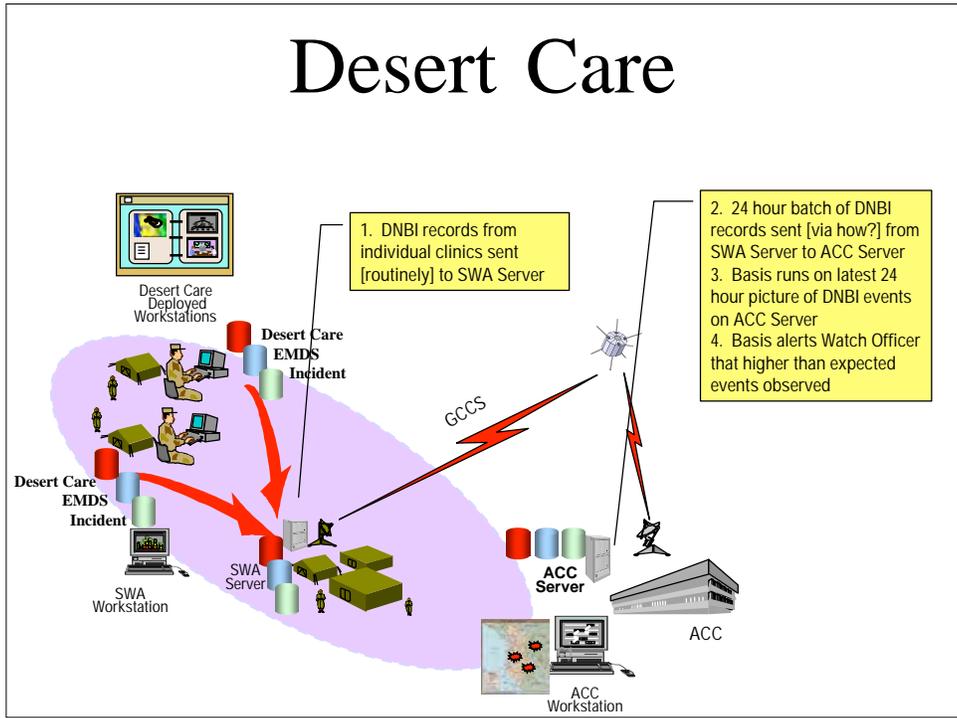
Watch Board
File Edit View Help

Fire at Camp George West | Explosion at Denver Library During G8

Watch Officer Maj Malone	Wind Direction 360 315 045 270 090 225 135 180	Weather Data WBGTI 74 Wind 10 Flag Green	Contamination/Hazard Type Contamination(s) Sarin Detection/ID Method - Other Hazards Present -	Stay Times Level-A Level-B Level-C 120 Level-D
Checklist 2. Commence Unit Recall Code: MARINERS From: S3 To: Watch Officer Time: 1327	Comm Plan	Call Signs & Freqs Alto: 12 O BIRF: 12345 Cenulion: 12345 Rome1: 4567 4567 Moses: 12345 PIHBUJ: 15 Ruckback: 56788 Stingray: 619.562.5295 Viper: 34565	Other Agencies On Sce...	CBIRF Personnel By Zo... Hot Zone 1 Warm Zone 1 Cold Zone
Casualty Estimate Hot ... Black Red Yellow Green	Patients Processed Me... Black Red 34 Yellow 26 Green 11	Personnel Processed T... Black Red Yellow Green	CBIRF Casualties C/B Wnded 3 C/B Dths 4 Cvn Wnded 2 Cvn Dths 1 MedEvaced 1	Notes Terrorist was located on Notes (10/01 16:35)

Mon Oct 06 12:24:43 PDT 1997

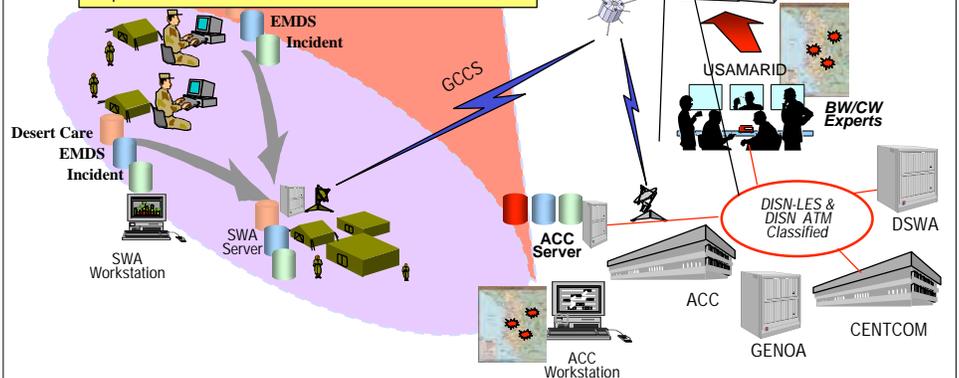
Computer generates plastic bar-code tag for patient



Desert Care

- Create Possible BW Event in GENOA Crisis Information Package (CIP) and establishes Collaboration Services between BWD Repository and CIP
- Push data to DSWA for source term analysis
- First draft time-based plume model pushed to ACC Server
- CODA runs casualty projections - expected rate/location of sick soldiers and initial projection of mitigation responses

1. Watch Officer sends Alert Notice to USAMRIID for assistance
2. ACC Server pushes required objects to USAMRIID [pat records, analyses]
2. ACC - USAMRIID collaborate over shared map depicting warning cases and look at selected patient records



Desert Care

- ACC Server pushes Smart Message to SWA to add additional business objects for Mitigation Response [new questions, reset triggers, alerts, queue times]
- Push BWD Plan objects [subplans, triggers, estimated resources, business rules, etc] to JTF Planner - ALP

