



Engineering Overview

JMO-T
Advanced Concept
Technology Demonstration

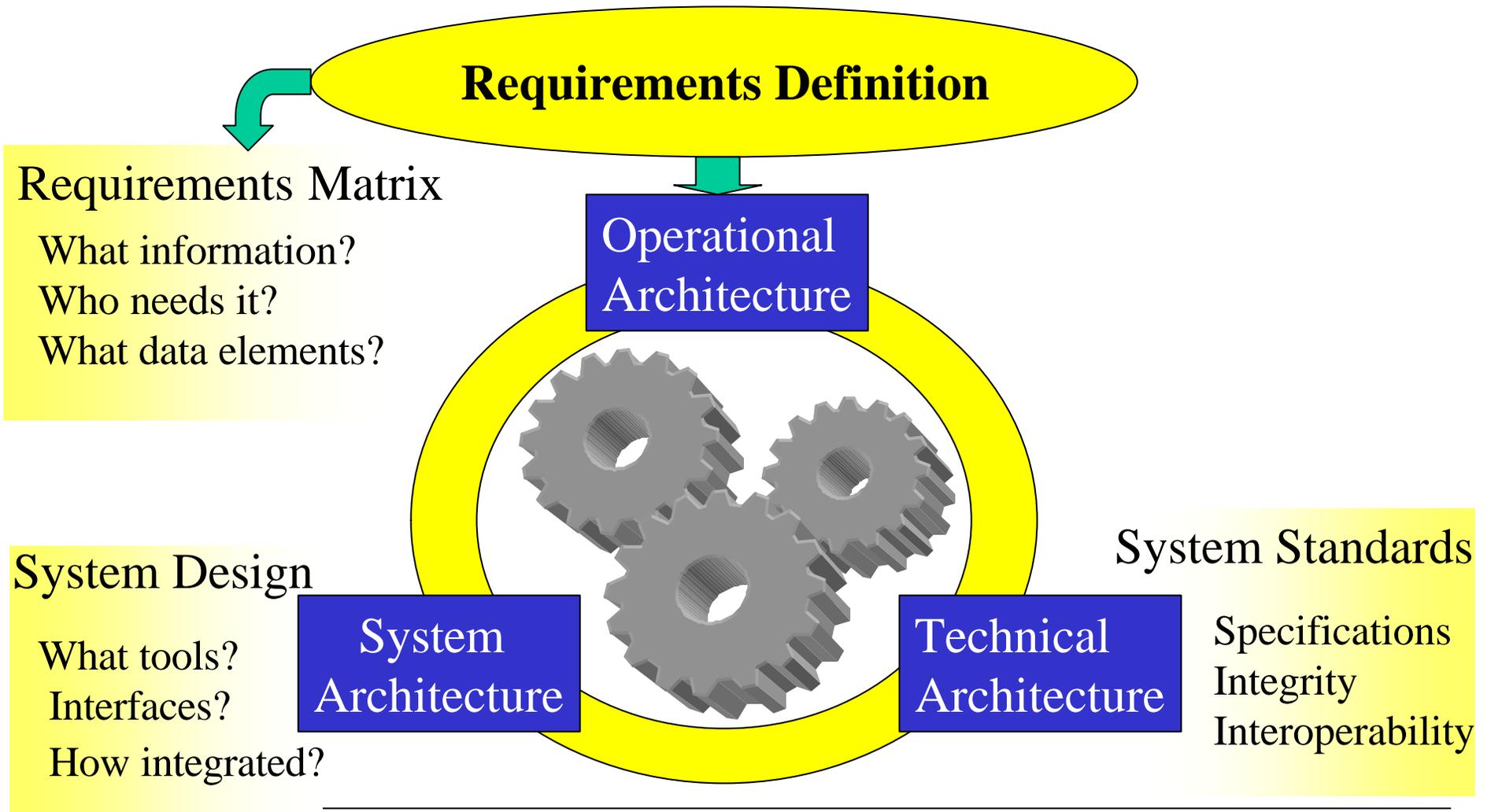
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The Process

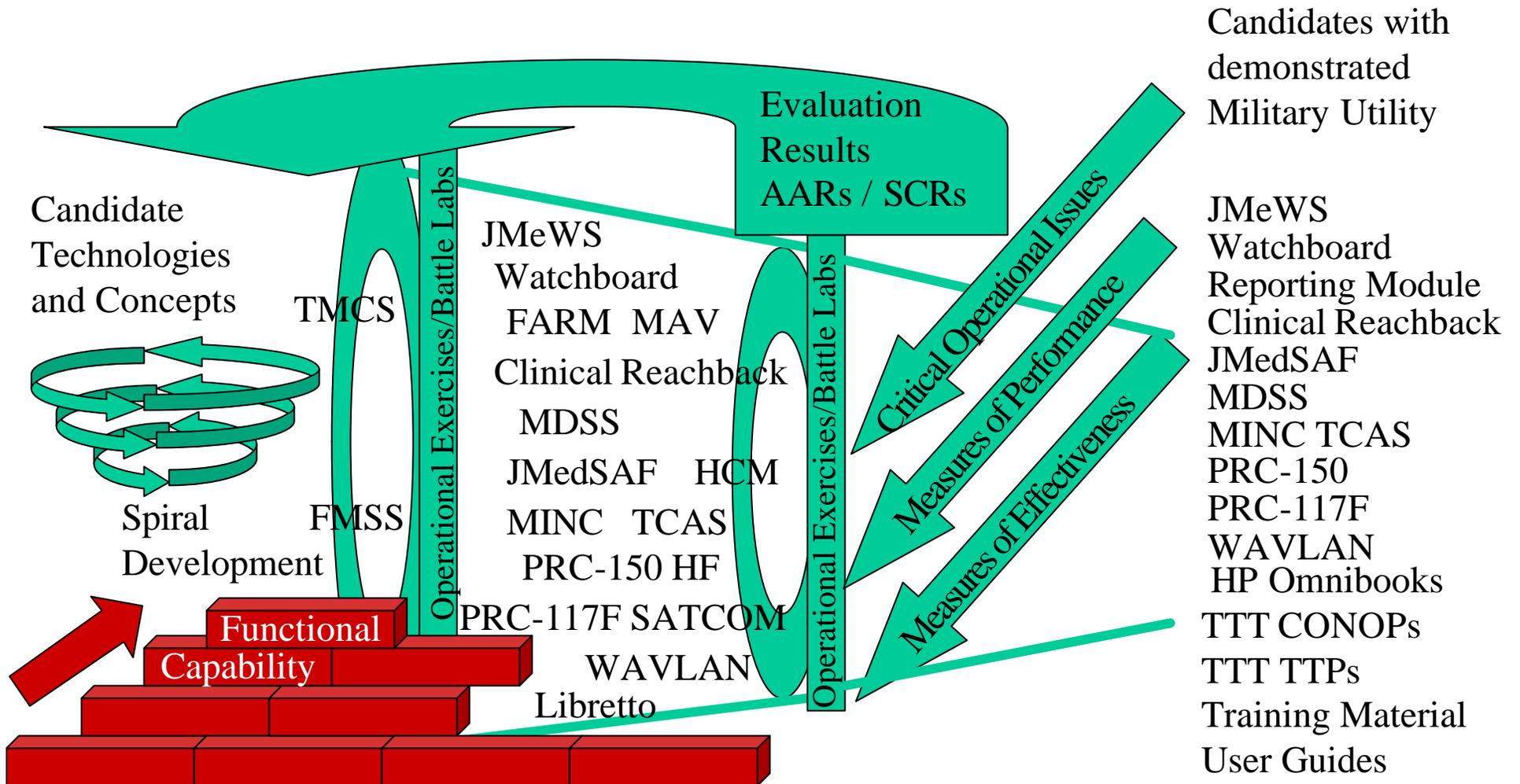
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Technology Funnel

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Operational Architecture: Definition

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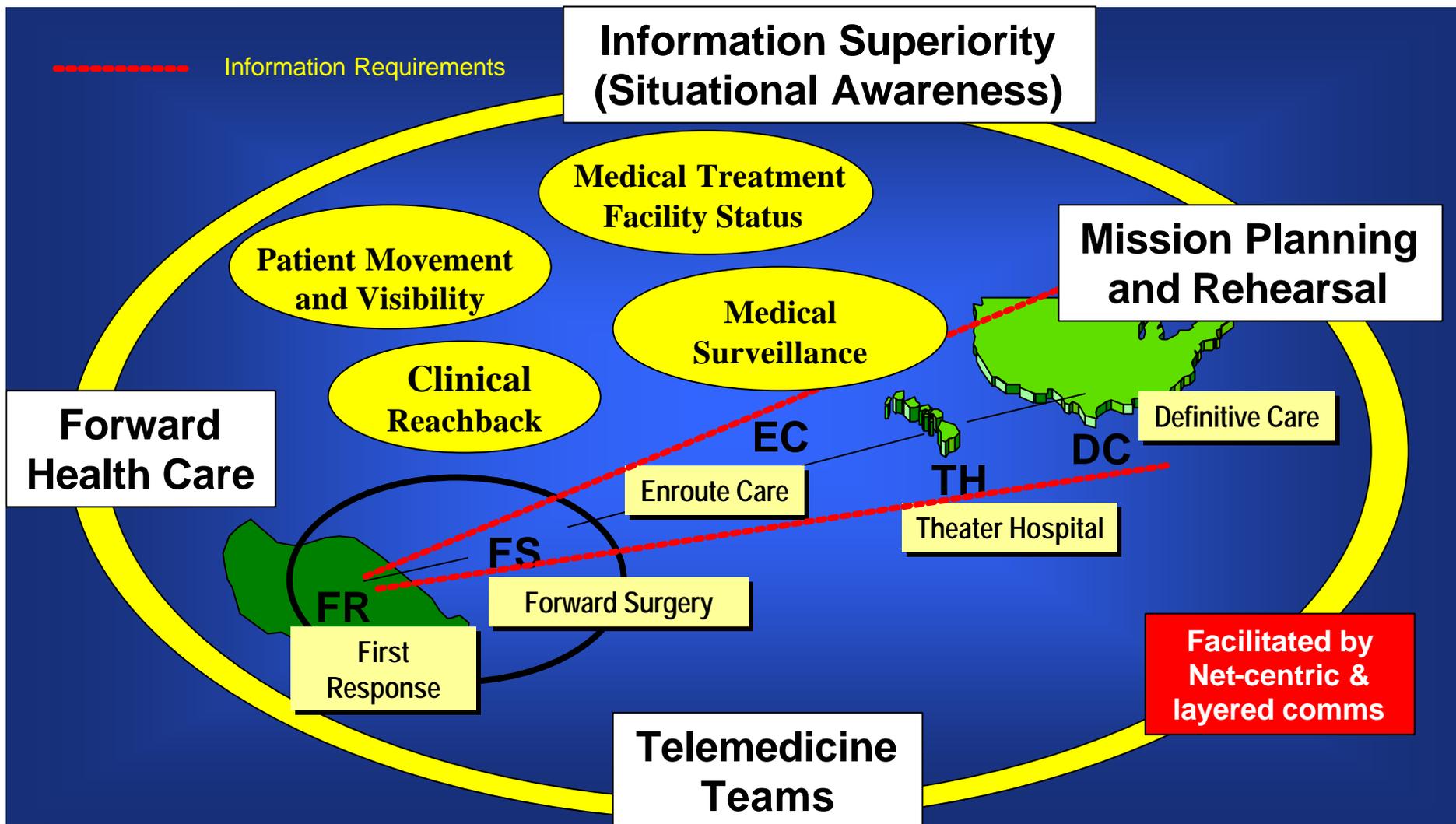
“The operational architecture view is a description of the tasks and activities, operational elements, and information flows required to accomplish or support a military operation.”

- Descriptions of the operational elements
- Assigned tasks and activities
- Information flows required to support the warfighter
- Types of information exchanged
- Frequency of the exchange
- Which tasks are supported by the exchanges
- The nature of the exchanges in detail sufficient to ascertain specific interoperability requirements



Operational View

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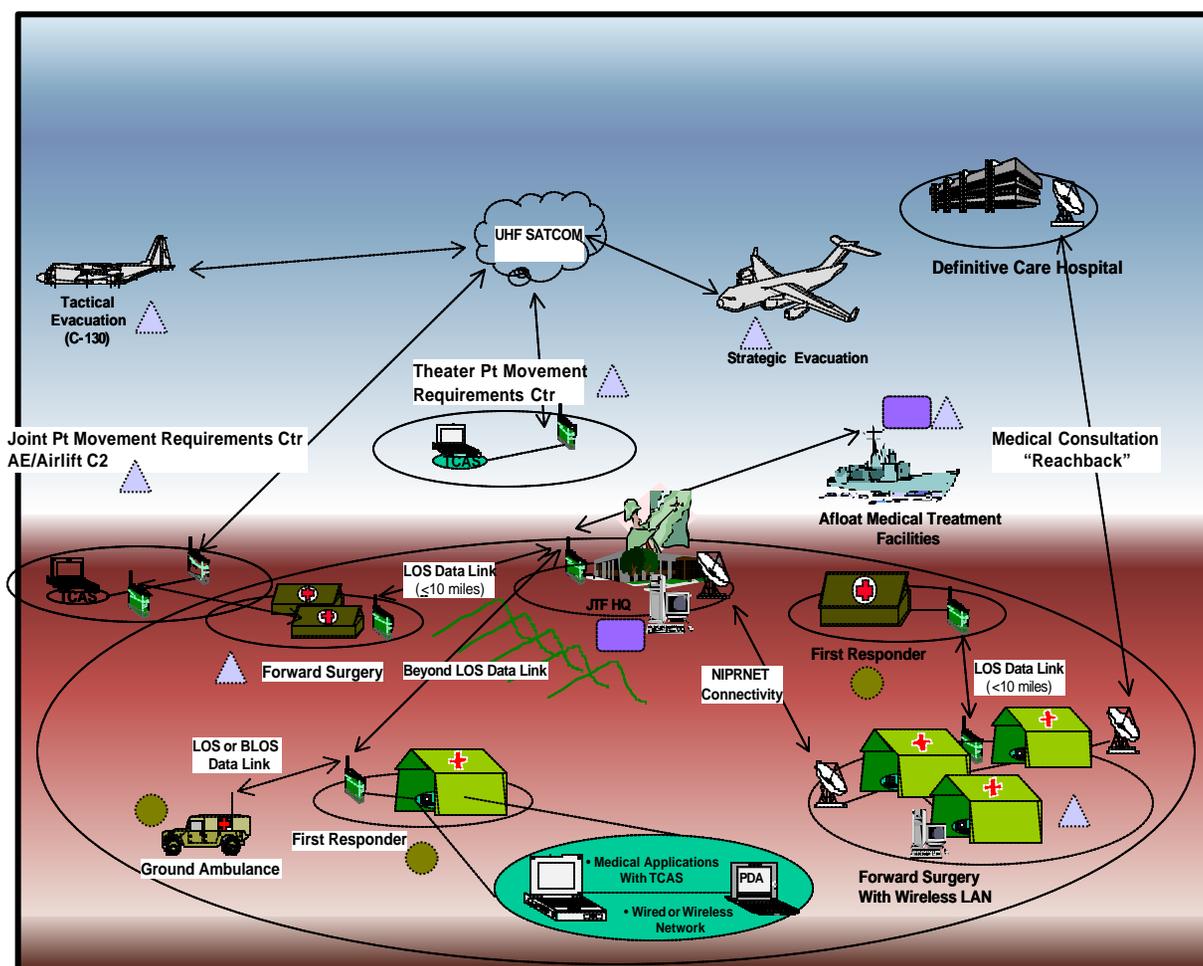




JMO-T Systems Architecture

Concept of Operations

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-  **JTF HQ Ashore or Afloat Watchboard**
-  **Full Complement of MTFs**
Net-centric data exchange
-  **Logical Networks Established**
Shared Situational Awareness
Field MTF Support
Air Evac Information Exchange
Clinical Reach-back
-  **Network of "Subnets"**
Sites connected by HF
Sites connected by VHF/UHF
Sites connected by NIPRNET
Sites connected by POTS
-  **Range of Data rates**
As low as 1.2kbps on HF
As high as 256 KB over NIPRNET
-  **Wireless LAN (WAVELAN)**
- 802.11b where sensible within MTFs

 - Echelon 1  - Echelon 2 / Bravo Team  - JTFHQ / Alpha Team



Applications Overview

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- ✍ Joint Medical Workstation (JMeWS) – Oracle 9.i database/applications
 - Micro-Internet Controller (MINC)/Team Care Automated System (TCAS)
- ✍ Reporting Module
 - Patient Reports
 - ANNEX Q Reports
- ✍ SNAP Automated Medical System (SAMS v8.2/8.3 & 9.0)
- ✍ WatchBoard - Medical battlespace situational awareness display
- ✍ Clinical Reachback (MedX7!)
- ✍ Medical Data Surveillance System (MDSS)
- ✍ Joint Medical Semi-Automated Forces (JMedSAF)
- ✍ Healthcare Complex Model (HCM)



Layered Communications Network JMO-T

Data Exchange Options

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✍ NIPRNET (128 KBPS)

✍ PRC-150 HIGH FREQUENCY RADIO (2.4-9.6 KBPS)

✍ PRC-117F / PSC-5 SATCOM (2.4 KBPS)

✍ INMARSAT (VOICE and 9.6 - 64 KBPS)

✍ CELL PHONE (VOICE and 9.6 KBPS)



Reporting Module

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Patient Reports

- SF 600 Chronological Record of Medical Care
- Hospitalization Report
- Host Nation Report
- MEDEVAC Report (Tactical Ground/Air)
- Air-Evacuation Patient Information (API)

ANNEX Q Reports

- Joining Report
- Capability Report
- Medical SITREP
- Blood Report



Joint Medical Workstation (JMeWS)

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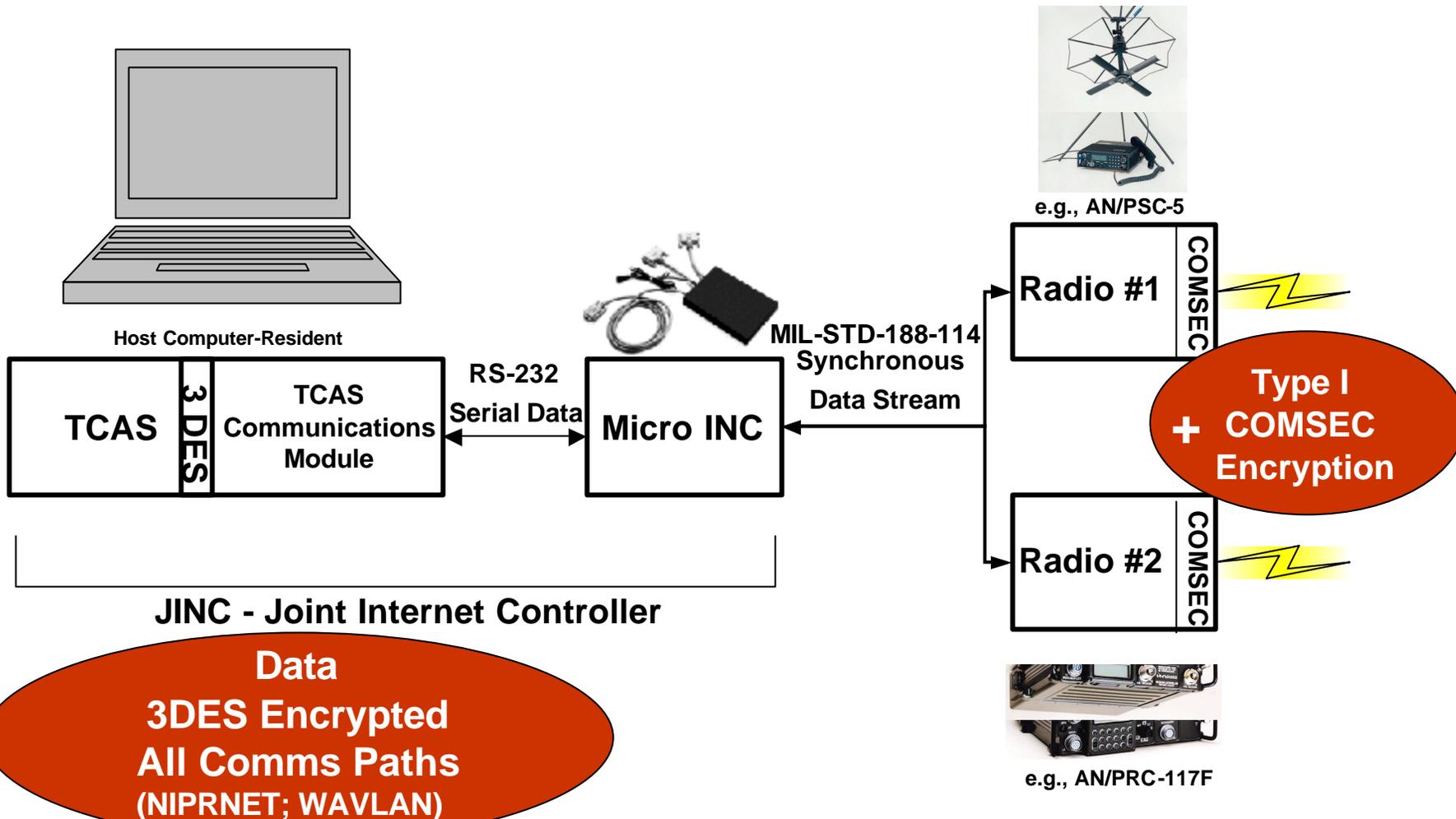
- ✍ Mobile Medical Data Store (MMDS) – Oracle 9.i database local/theater
 - Object-Relational Database Management System (O-RDBMS)
 - Secure Socket Layer (SSL) Client/Server access
 - Oracle Advanced Security Module – 3DES encryption

- ✍ Micro-Internet Controller (MINC) / Team Care Automated System (TCAS)
 - Provides low bandwidth (2.4-64 Kbps) data networking capabilities to **existing military tactical radio systems (HF, SATCOM, VHF, UHF)**
 - Allows creation of sub-networks of same frequency tactical radios and bridging of different frequency subnets into a consolidated network
 - Conversion from RS-232 serial data to a synchronous MIL-STD-188-114 data stream. Each data controller can support up to two radio systems
 - Team Care Automation System (TCAS) communications software – uses object-oriented compression scheme to enhance data exchange at low bandwidths (3DES encrypted)



Joint Internet Controller (JINC)

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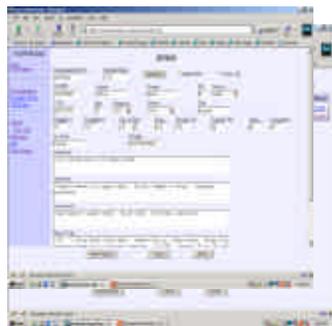


Near Real-Time C2

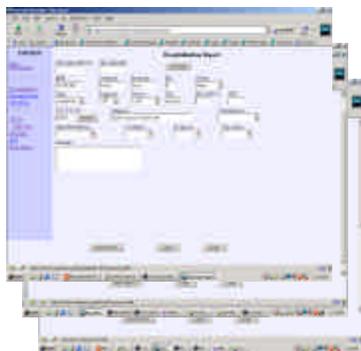
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**Patient Tracking,
Visibility and Status**

SF 600
- Sick Call Log



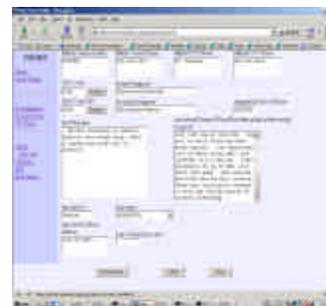
Hospitalization
- Provider Note
- OR Note



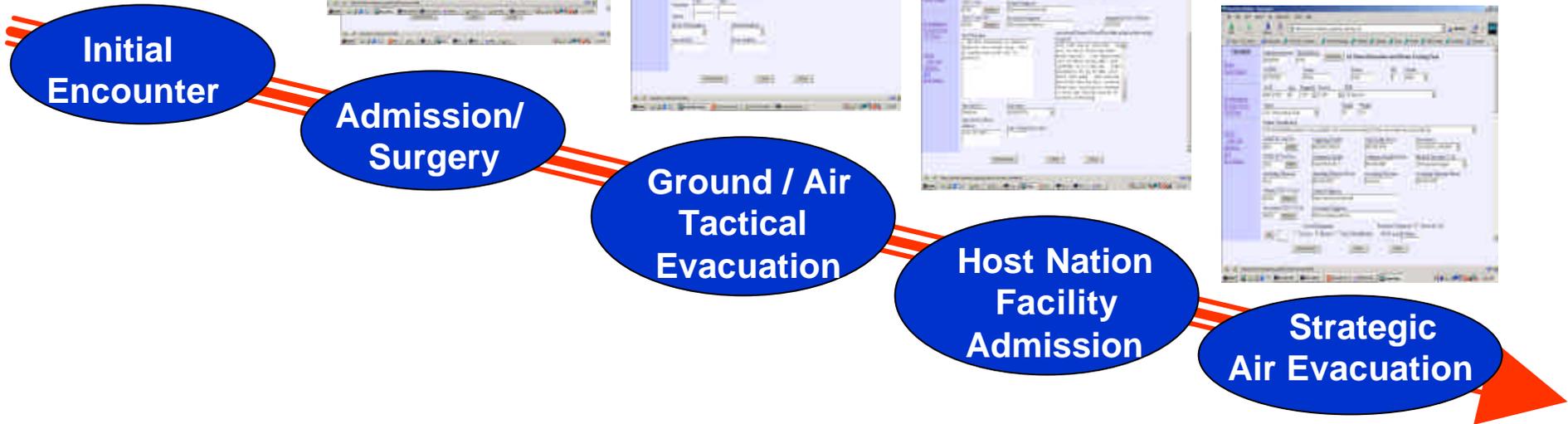
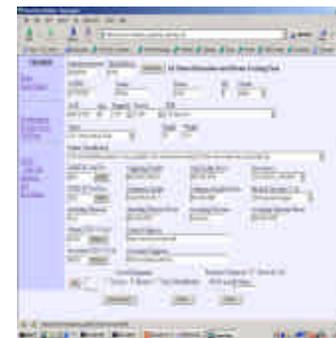
MEDEVAC



Host Nation



**AE Patient
Information (API)**

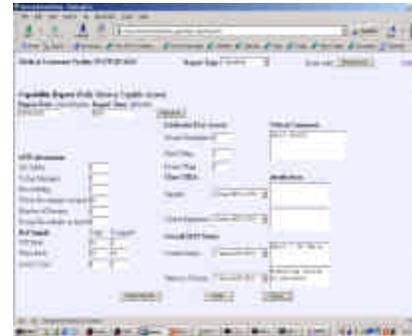




Annex Q Reporting

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Facility Readiness



Joining
w/ Personnel

Capabilities
w/ Personnel

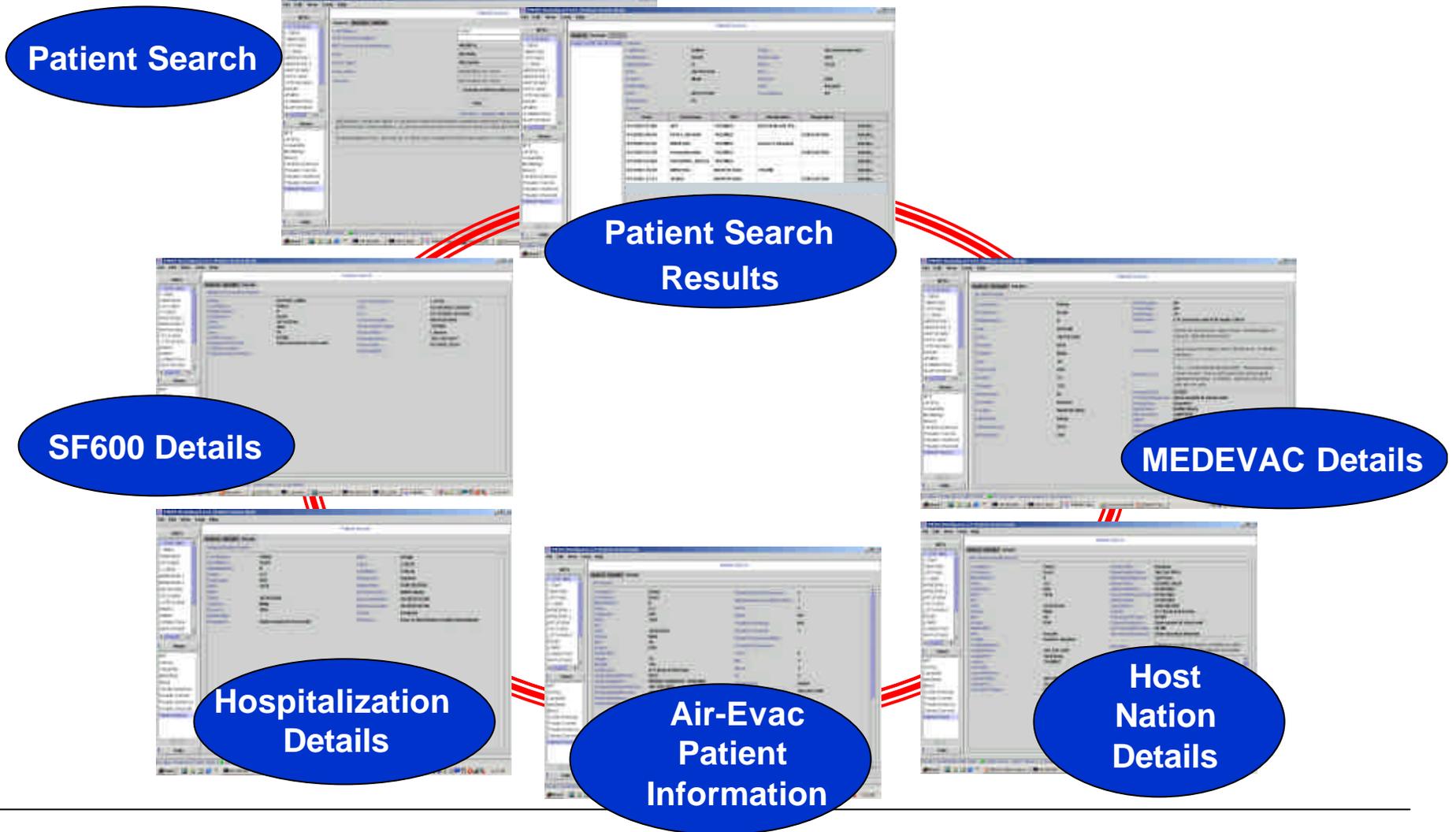
Medical
SITREP

Blood



Watch Board Patient Visibility

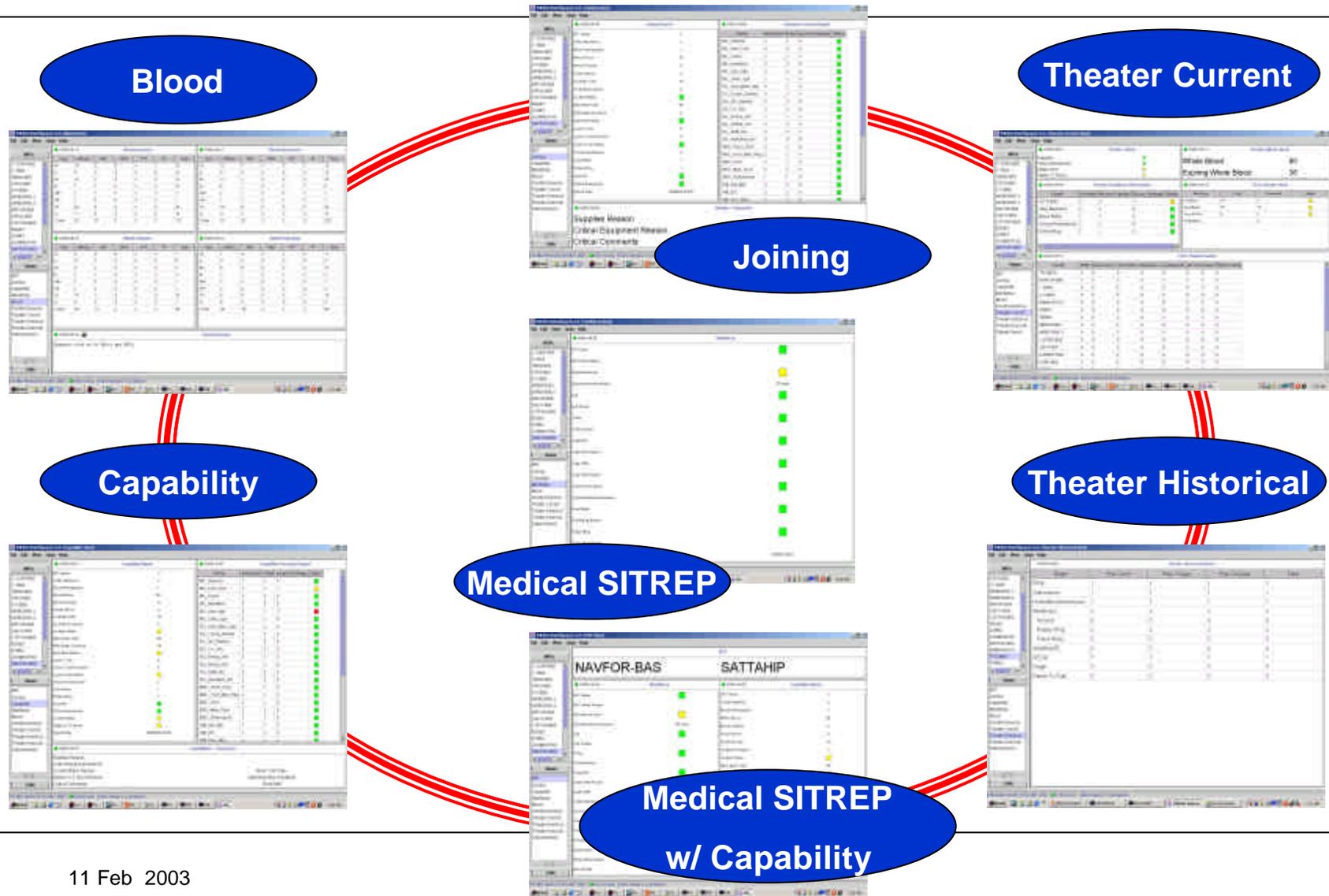
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Watch Board Facility Status

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Medical Data Surveillance System JMO-T (MDSS) Standard Reports

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DNBI Report

Weekly DNBI for All Unit(s) and for 3rd MED BN, 3rd MED BN MTF (selection screen)

Calculated PAR was 723

Your Selections	
Menu Title	Your Selection
MTF	3rd MED BN
Unit	All
Patient Type	Simulated Patient
Start Date	2001-03-24 00:00:00
End Date	2001-03-30 23:59:59
PAR	(Average) 723

Disease and Non-Battle Injury Category	Weekly Incidence
Dermatological	0
Unexplained Fever	0
Gastrointestinal	0
Gynecologic	0
Heat/Cold	0
Sports Injury	0
Motor Vehicle Accident Injury	0
Work Injury	0
Other Injury	14
Ophthalmological	0
Psychiatric Mental	0
Psychiatric Stress	0
Respiratory	0
STD	0
Other Medical/Surgical	0
Total	14
Category	Weekly Incidence
Dental	0
Misc/Admin	0

Reportable Conditions

Summary Reportable Conditions for All Unit(s) and for All MTF(s)

Calculated PAR was 20

Most recent reports as of 7/5/2001 16:12:23 (GMT)

Reportable Conditions	Incidence Count	Incidence Rate
Frostbite of face (99100)	0	0

Ill Defined Conditions

Weekly Ill-Defined Conditions for All Unit(s) and for All MTF(s)

Calculated PAR was 9188

Most recent reports as of 6/5/2001 13:47:46 (GMT)

Category	Weekly Incidence	Weekly rate per thousand	Days of Light Duty
Abdominal Pain	2	0.0022	
Breathing Labored	2	0.0022	
Bronchitis (diffuse)	0	0	

Major ICD 9 Codes

Major ICD-9 Code for All Unit(s) and for All MTF(s)

Calculated PAR was 888

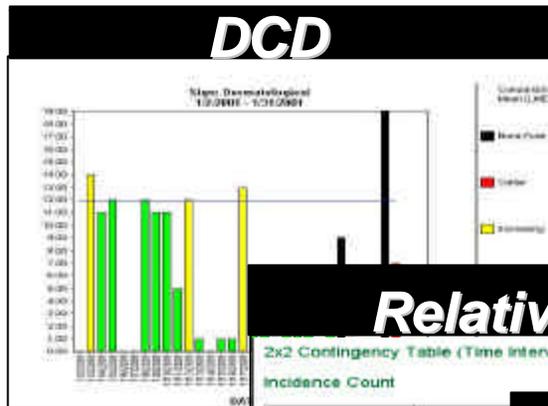
Most recent reports as of 10/5/2001 13:44:40 (GMT)

Major ICD-9 Code	Weekly Incidence	Weekly rate per thousand	Days of Light Duty	Lost Work Days	In-Patients	Out-Patients
Infectious and parasitic diseases (ICD-9:001-139)	11	0.0123			0	18
Neoplasms (ICD-9: 140-239)	0	0			0	0
Endocrine					0	



Medical Data Surveillance System JMO-T (MDSS) Analyses Capability

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Dynamic Change
Point Detection

Relative Risk

2x2 Contingency Table (Time Interval) for All
Incidence Count

Time Interval:	Dermatological	Total
2001-05-13 to 2001-05-19	11	11
2001-05-20 to 2001-05-26	14	14
Total	25	25

Test threshold = 3.841
Odds Ratio = 0.4453
Risk Ratio = 0.4798
Fisher's Test = 4.1049
Fisher's Test with Yates Corre

Alert Matrix

Date	2001-05-13	2001-05-20	2001-05-27	2001-06-03	2001-06-10	2001-06-17	2001-06-24	2001-07-01	2001-07-08	2001-07-15
Dermatological	11	0	0	0	0	0	0	0	0	0
Genitourinary	0	0	0	0	0	0	0	0	0	0
Gastrointestinal	0	0	0	0	0	0	0	0	0	0
Heart/Circ	0	0	0	0	0	0	0	0	0	0
Musculoskeletal	0	0	0	0	0	0	0	0	0	0
Neurological	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Psychiatric/Mental	0	0	0	0	0	0	0	0	0	0

Patient List

Chemical warfare agent exposure (08000) Patient List (by unit)

Unit	08000	08000
1. AAKK 08000-0001	08000	08000
2. AAKK 08000-0002	08000	08000
3. AAKK 08000-0003	08000	08000
4. AAKK 08000-0004	08000	08000
5. AAKK 08000-0005	08000	08000
6. AAKK 08000-0006	08000	08000

Patient Record

Patient Treatment Report

1. AAKK 08000-0001

2. AAKK 08000-0002

3. AAKK 08000-0003

4. AAKK 08000-0004

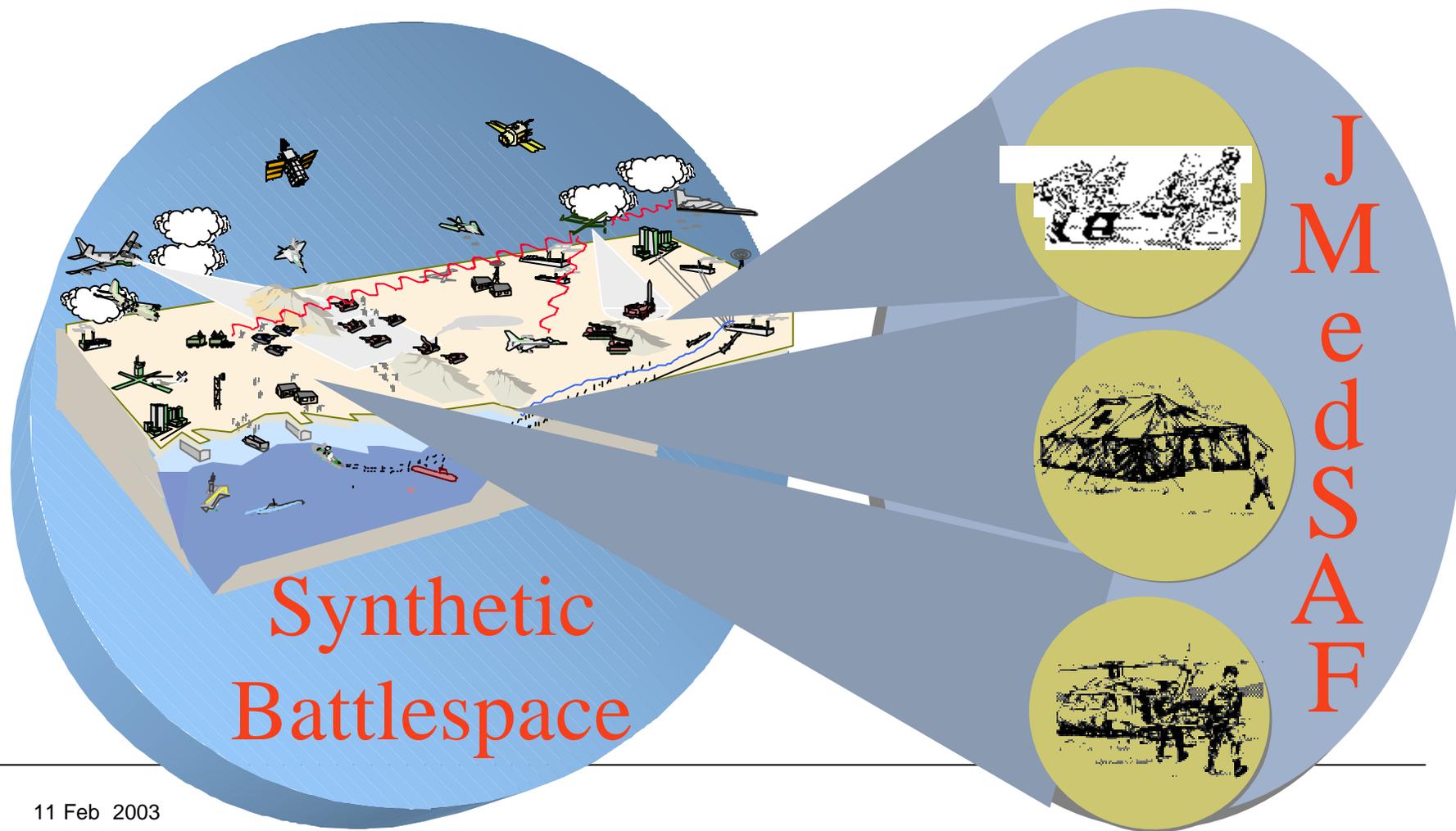
5. AAKK 08000-0005

6. AAKK 08000-0006



Joint Medical Semi-Automated Forces (JMedSAF)

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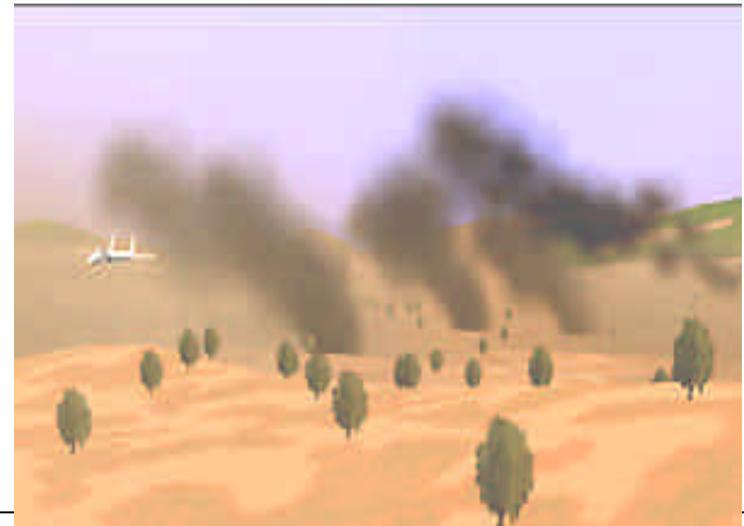




Features of Joint SAF

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- Synthetic Force Objects (sample list)
 - FWA, RWA, Tanks, Jeeps, Trucks, Individual Combatants (ICs), LHDs Divers, Missiles, Commercial Air/Ships
 - Objects composed of... Weapons systems, Sensor systems, Communication systems, Maneuver systems, Physical attributes
- Behaviors use or “task” objects
 - Tanks working as platoons/companies, Individual Combatants work as rifle teams/squads, special ops teams
 - Mine neutralization tactics, Anti Air warfare
- Synthetic Environments composed of integrated environmental models and databases
 - ✍ Multi-State Objects
 - ✍ Dynamic Weather
 - ✍ Environmental Effects on Objects
 - ✍ 2D/3D Visualization
 - ✍ Multiple C4ISR interfaces





Allows the User To...

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- ✍ Rehearse Plans and Courses of Action
- ✍ Augment Tests and Operations with Virtual Systems and Participants
- ✍ Model & Evaluate New Systems
- ✍ Evaluate New Doctrine, Concepts, and Tactics, Techniques and Procedures

***Integrated* into a Joint Synthetic Battlespace**



JMedSAF Medical Simulation Enhancements to JSAF

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Entities

- Medical Treatment Facility
Examples
 - Battalion Aid Station, Surgical Company
 - Combat Support Hospital, Fleet Hospital
 - Host Nation Facilities, Refugee/IDP Camps
- Ambulances
 - HMMWV, M113
- Tactical and Strategic Air Evac
 - UH-60, C-130, C-141, C-9
- CRTS (LHD)
- USNS Mercy

Behaviors

- Casualties
 - WIA, DNBI
- Evacuation
 - Manual or Auto
 - Affected by Terrain and Environment
- Medical Facilities
 - Beds, Equipment
 - Personnel, Supplies
 - Telemedicine





JMedSAF Characteristics

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- **Casualty Sources**
 - WIA caused by force on force interactions
 - DNBI generated based on Population at Risk, one of three geographic DNBI distributions, and variable mission length
 - Specific diseases and disease distributions may be injected to support MSEL execution
- **Casualty Treatment**
 - Treatment required based on DEPMEDs protocols and Time, Task, Treater Files (TTTF) as implemented by MAT
 - MTF stay time and probability of recovery based on Patient Code (PC) and available treatment



JMedSAF Characteristics (Cont.)

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- Medical Treatment Facilities (MTF)
 - Basic MTF Templates based on MAT templates
 - Host Nation facilities and Refugee/IDP camps also available
 - Variable staffing, supply, holding and treatment capability
 - Configuration may be changed during exercise play
 - Length of stay dependent on time required to stabilize and treat specific PC
- Evacuation Simulation
 - Inadequate MTF resources generate evacuation request
 - Selected destination based on facility's ability to treat patient
 - Patients expected to exceed evacuation policy will be evacuated out of theater upon stabilization



JMedSAF Characteristics (Cont.)

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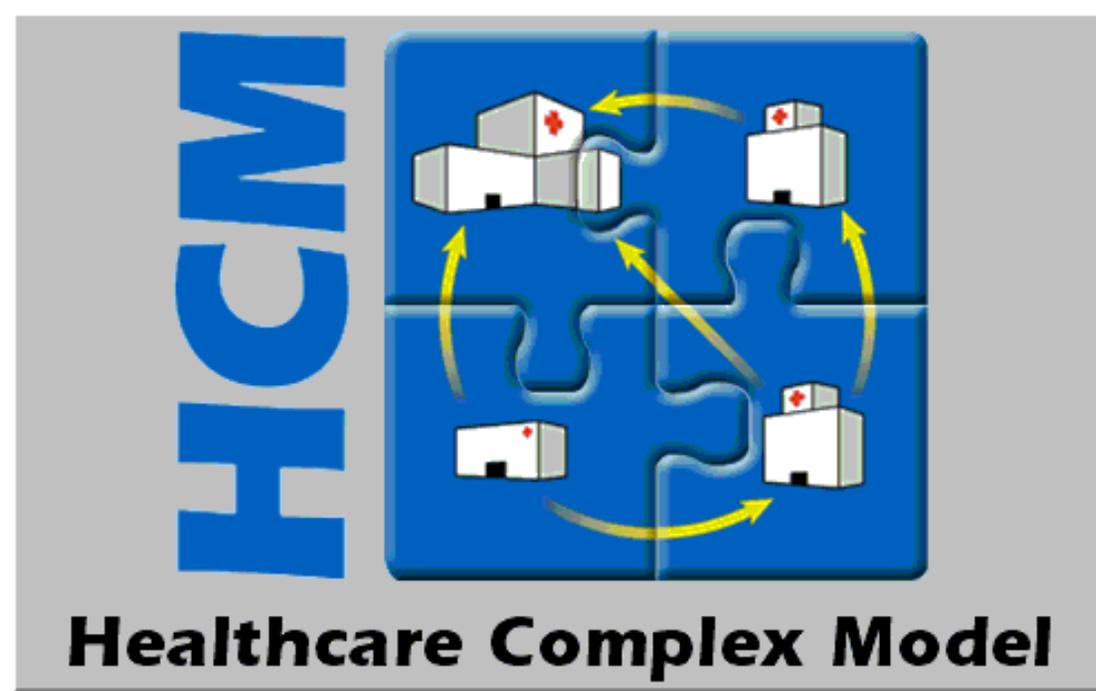
- Command and Control Messages for Situational Awareness
 - Casualty reports generated at point of occurrence
 - MTF Outpatient, Admit/Discharge, and In Transit Reports generated as occurring
 - Evacuation requests generated as necessary
 - Blood, Capability, SITREP, and Joining Reports generated to provide status of MTFs
 - Information displayed on Medical C2 system (Watch Board and MDSS)



Healthcare Complex Model (HCM) JMO-T

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A Tool for Medical Contingency Planning

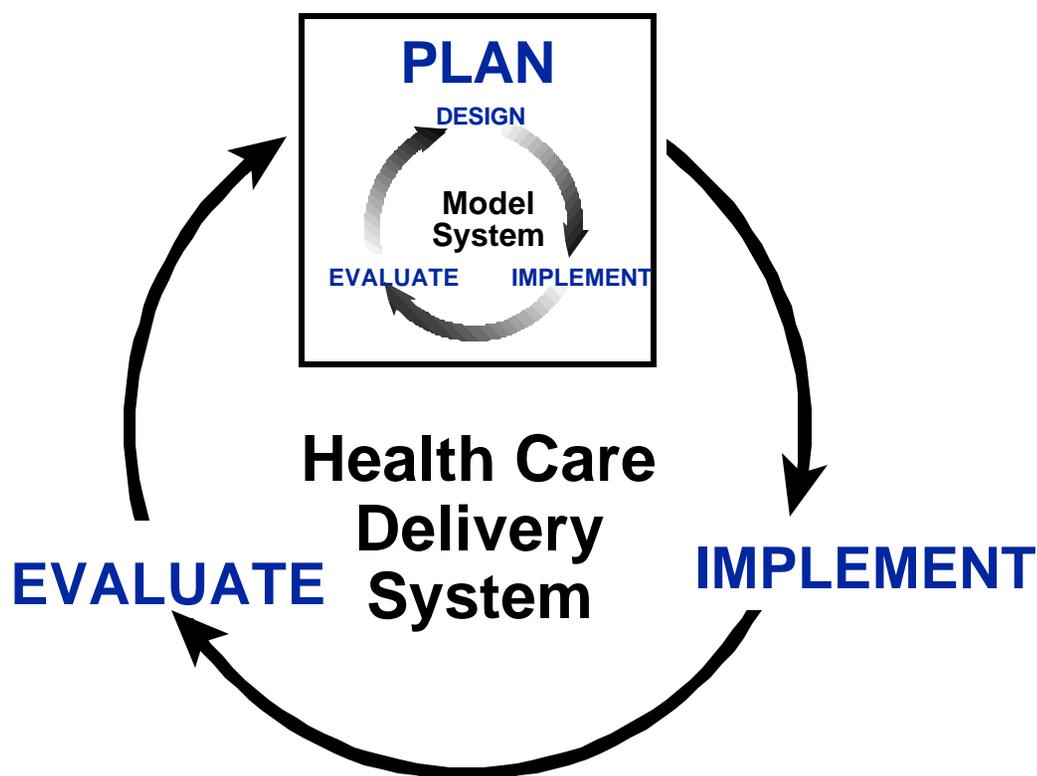




Simulation-Based Analysis Approach

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Using simulation-based planning as an enabler of health care system deployment



Where/How to expand telemedicine?

What are resource allocation implications?

What medical services increase the RTD rates?

What if....?

Overview of HCM

HCM simulates healthcare delivery through discrete events at the patient episode level throughout a large network of facilities.

