Medical Simulation and Information Sciences Research Program (MSISRP)

UNCLASSIFIED

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- **MSISRP/JPC-1**
  - Research is requirements driven: all funded efforts must align to capability gaps, end-user needs, and requirements.
  - Funds: DHP Core and Congressional Special Interest (CSI), distributed via assistive agreements, contracts, and intramural awards
  - Full lifecycle product management capabilities (identification of problem, basic and applied research, advanced development, acquisition, logistics, fielding, and modernization for subsequent increments)
 - Awards may be either intra- or extramural

MSISRP Strategic Documentation

- DHA JPC Charter for Medical Simulation and Information Sciences, OSD(HA), 4 December 2014

- DHA Research Development and Acquisition Directorate SOP, 14 May 2014

- DHA HIT Strategic Plan 2016-2019

- Health Readiness CONOPS

- Health Service Delivery CONOPS

- Health System Support CONOPS

- Force Health Protection CONOPS

- ICD Combat Casualty Care Training Technologies (8-Aug-2016)
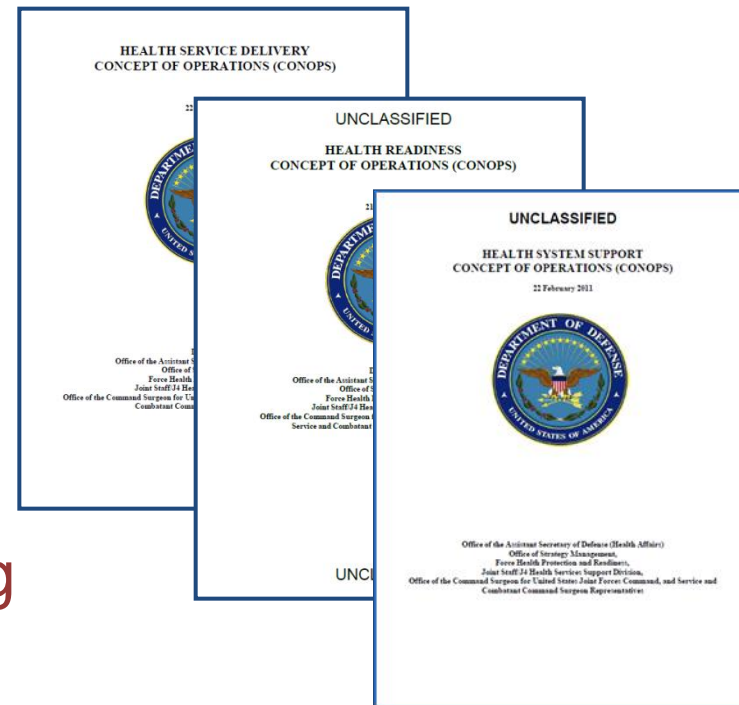
Joint Concept for Health Services (JCHS)

31 August 2015

Distribution Statement A
Approved for Public Release

JCS Joint Concept for Health Services (Aug 15)

- Care dispersed over long distances
- Increased medical capability with smaller footprint
- Global network of Health Service Nodes
- Global synchronization
- Interoperable medical capabilities
- Prolonged care in place
- Technology focused
- Specifically cites telemedicine

Medical Simulation and Information Science Research Program R&D Focus Area

■ **_MISSION:_** To responsively and responsibly coordinate emerging military medical simulation and health information technologies/informatics research across all stakeholder communities and transfer research solutions and knowledge to meet MHS goals.

Medical Simulation & Training (MedSim)

- Combat Casualty Care Training
- Medical Readiness
- Tools for Medical Education

Joint Services

- Continuum of Care
- Joint Evacuation and Transport Training
- * Patient Management Clinical Standards
- Points of Injury Training System
- Medical Force Readiness: Skills Sustainment/Minimize Skill Decay

Health Information Technologies & Informatics (HITI)

- Theater & Operational Medicine Reach
- Theater & Operational Medicine Medical Intelligence /Agility

Joint Services

- Theater Data Capture, Transfer and deriving Medical Intelligence from data for CCC/Readiness
- Theater Virtual Health/Telehealth Data Management/Transfer & Integration
- Autonomous & Unmanned Monitoring and Data Handling/Storage Solutions

Vision: **Solving Complex Military Healthcare Problems Using Knowledge and Technology**

Goals:

- Advance military medicine training and education using medical simulation throughout the entire continuum of care
- Deliver combat casualty care training to support a high state of readiness and capability for military healthcare providers
- Create predictive models to assess healthcare providers high-quality military health care management
- Improve healthcare data capture, integration and transmission in and from theater operational environment
- Advance Medical Informatics capabilities within Military Health System (MHS)

Joint Capability Upper/ Lower Airway Trainer

Hands-free POI/PoC Theater EHR documentation prototype

Theater Teleconsultation /mobile Health

Virtual Tissue & Body Models

Point of Injury Training System

Joint Evacuation & Transport [Training] System (JETS): Architecture

Virtual Health/e-intensive care data exchange/storage for theater

Open source pharmacological agent tool kit/engine

POI bi-directional live and asynchronous video/audio/ JOMIS data exchange and management

SIPR to NIPR theater data exchange to EHR

Advanced Modular Manikin (AMM) Peripherals

Medical Cloud Connectivity to send/receive Theater data

Medical device Interoperability to support autonomous care

JPC-1: Medical Simulation & Information Sciences

Medical Modeling, Simulation & Training

Health IT and Informatics

Combat Casualty Care Training Initiative (CCTI)

- Identify Gaps, Evaluation Criteria, Metrics, & Evaluation Studies
- Training Assets for Continuously High State of Readiness
- Tissue Fidelity & Physiological Response
- Resiliency Training (Performance under Stress)
- Team (Collective) Training

Medical Readiness Initiative (MRI)

- Fostering Clinical Excellence (Competency & Certification)
- Pre-Intervention Rehearsal
- Assessment / Tutor Systems
- Translational Research: Clinical Outcomes

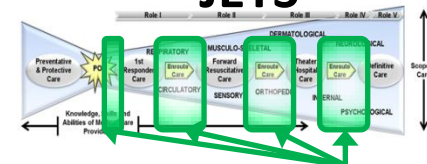### Tools for Medical Education (TME(I))

- Open Source / Architecture & Resource Sharing
- Training Platforms / Tools (Delivery of Content)
- Medical Model Repositories/ Libraries

Program Plans

JETS

JETS

POINTS
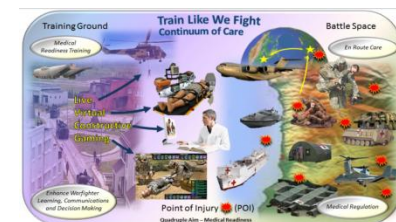
Medical Force Readiness

Medical Readiness

Overview of Medical Simulation Priorities

Improved Patient Outcomes Along the Continuum of Care

IPP #2

POINTS

IPP #1

JETS

Patient Surrogate

Interoperability

UFR #2

Medical Force Readiness

Potential Future Programs of Record: TBD

Hospital-Based

Rehabilitation & Reintegration

Global Health

S&T Initiatives:

Medical Readiness Initiative (MRI)

Tools for Medical Education (TME)

Combat Casualty Care Training Initiative (CCTI)

Program Concept Graphic

Task Area: Med Sim (JETS)

Train Like We Fight
Continuum of Care

Medical Readiness Training

En Route Care

Live
Virtual
Constructive
Gaming

Enhance Warfighter Learning, Communications and Decision Making

Point of Injury (POI)

Medical Regulation

Quadruple Aim – Medical Readiness

➤ JETS

o Develop an integrated, interoperable, & synchronous medical Joint Evacuation and Transport training environment & system utilizing Live, Virtual, Constructive, & Gaming (LVCG)

o Integration of an Open Architecture / Interoperable Advanced Modular Manikin to serve as a surrogate

o Deliver effective continuum of care and patient hand-over training for improved patient care

o Deliver usable patient movement training, with global 24/7/365 capability at the point of demand

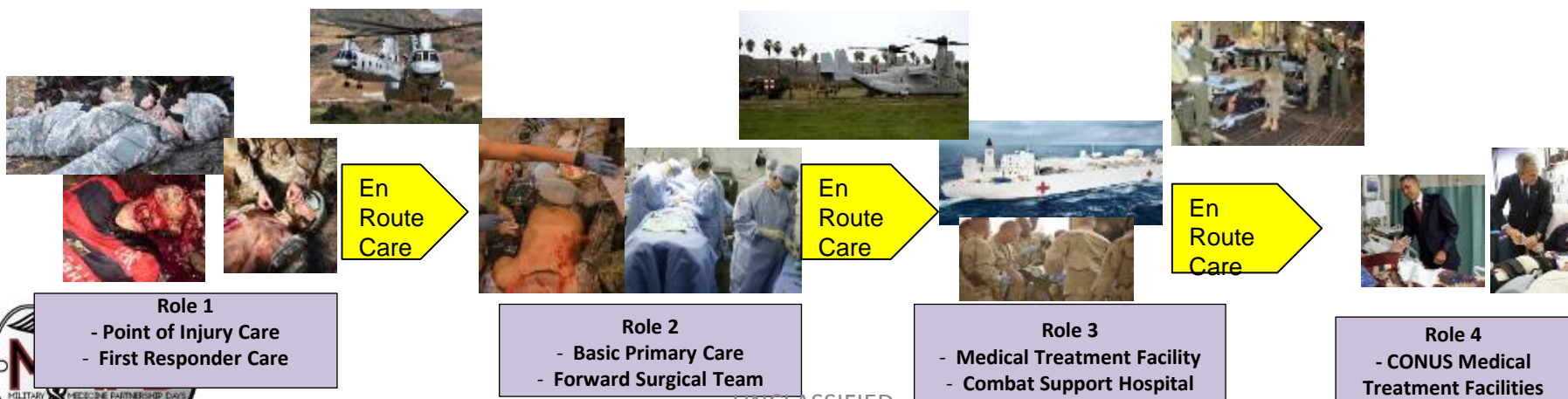o Integrate the JETS training platform across the DoD.

AMM (Intra-operable): Core with Peripherals, Peripherals to Core, and even Peripherals to Peripherals

Also Core to 'System'

Physiology Engine: Organ/Tissue system with Organ/Tissue system. Physiology of 'entire' human system.

Integrate Physiology Engine into AMM
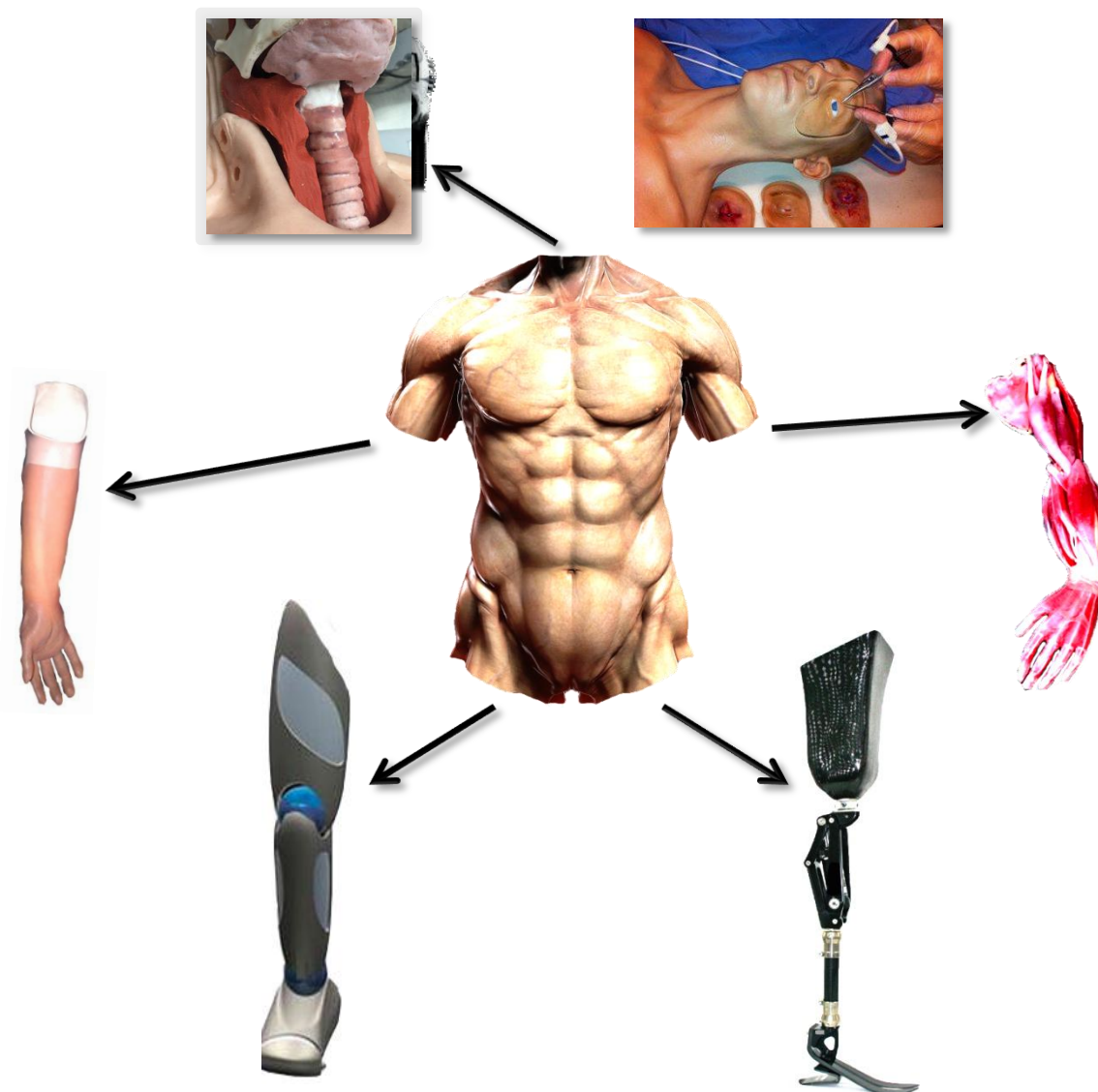
Public Physiology Research Platform

En Route Care

En Route Care

En Route Care

Role 1
- Point of Injury Care
- First Responder Care

Role 2
- Basic Primary Care
- Forward Surgical Team

Role 3
- Medical Treatment Facility
- Combat Support Hospital

Role 4
- CONUS Medical Treatment Facilities
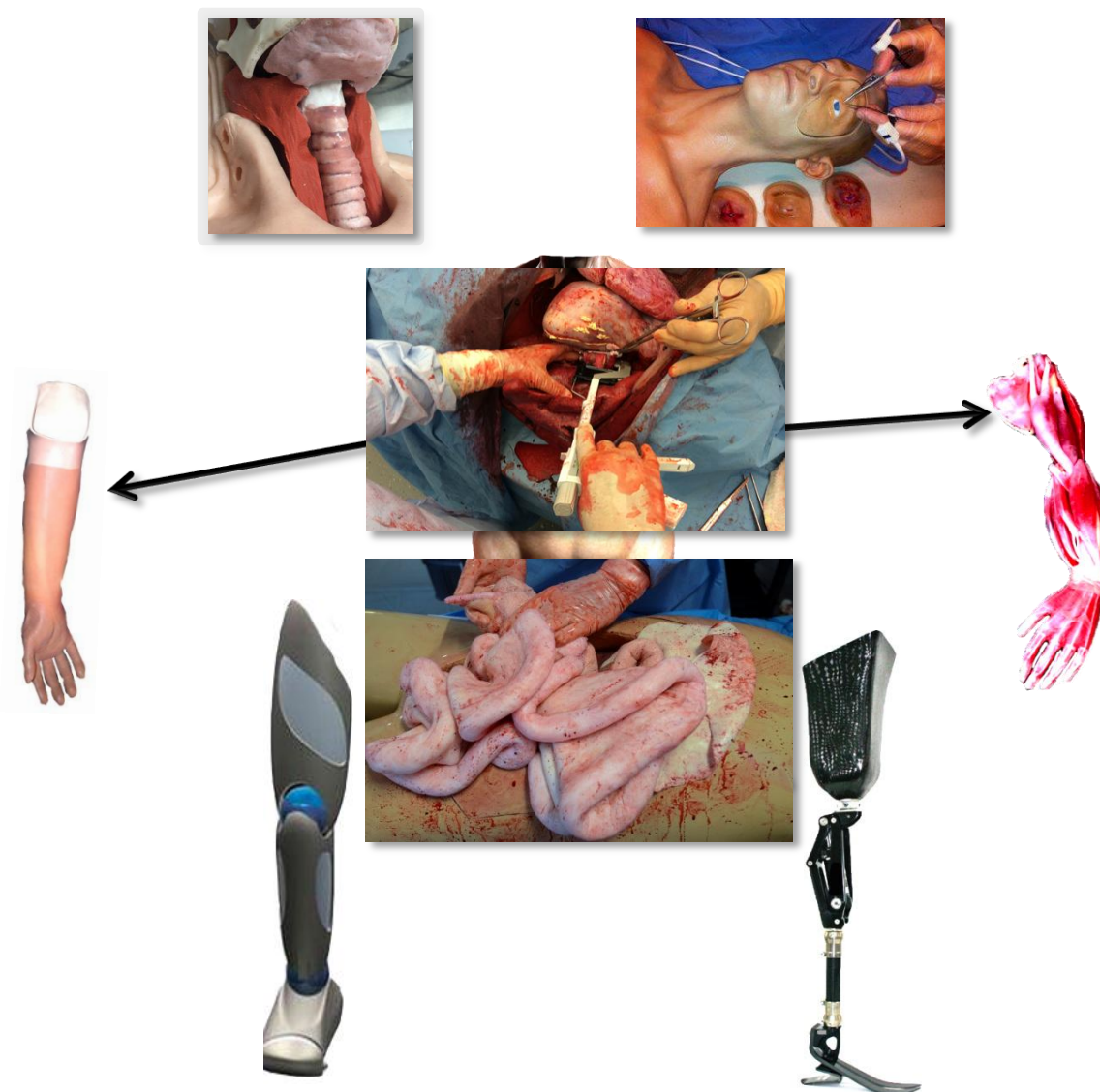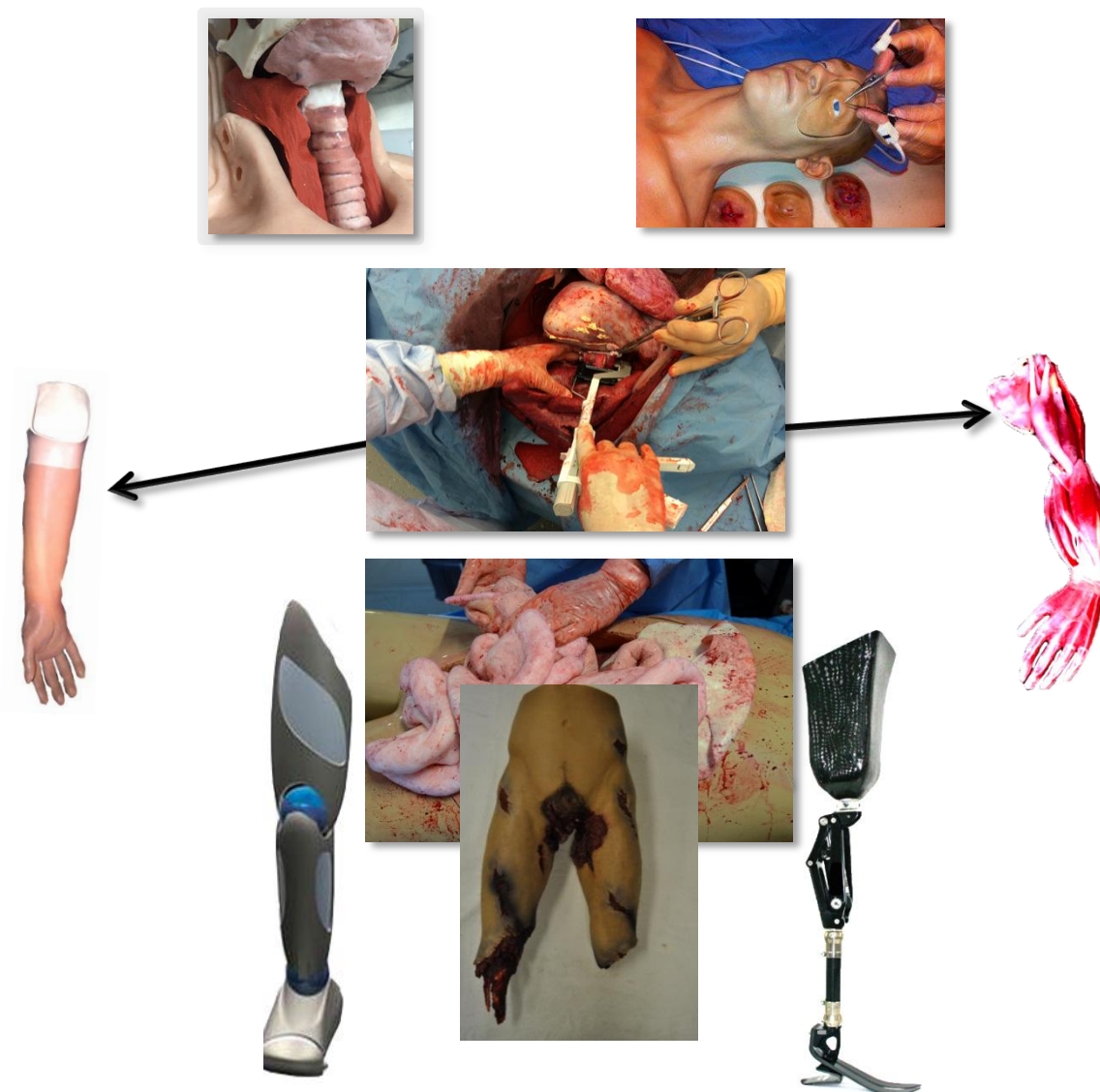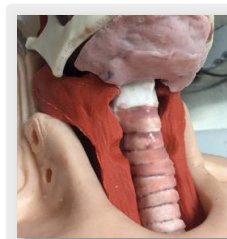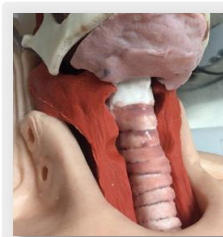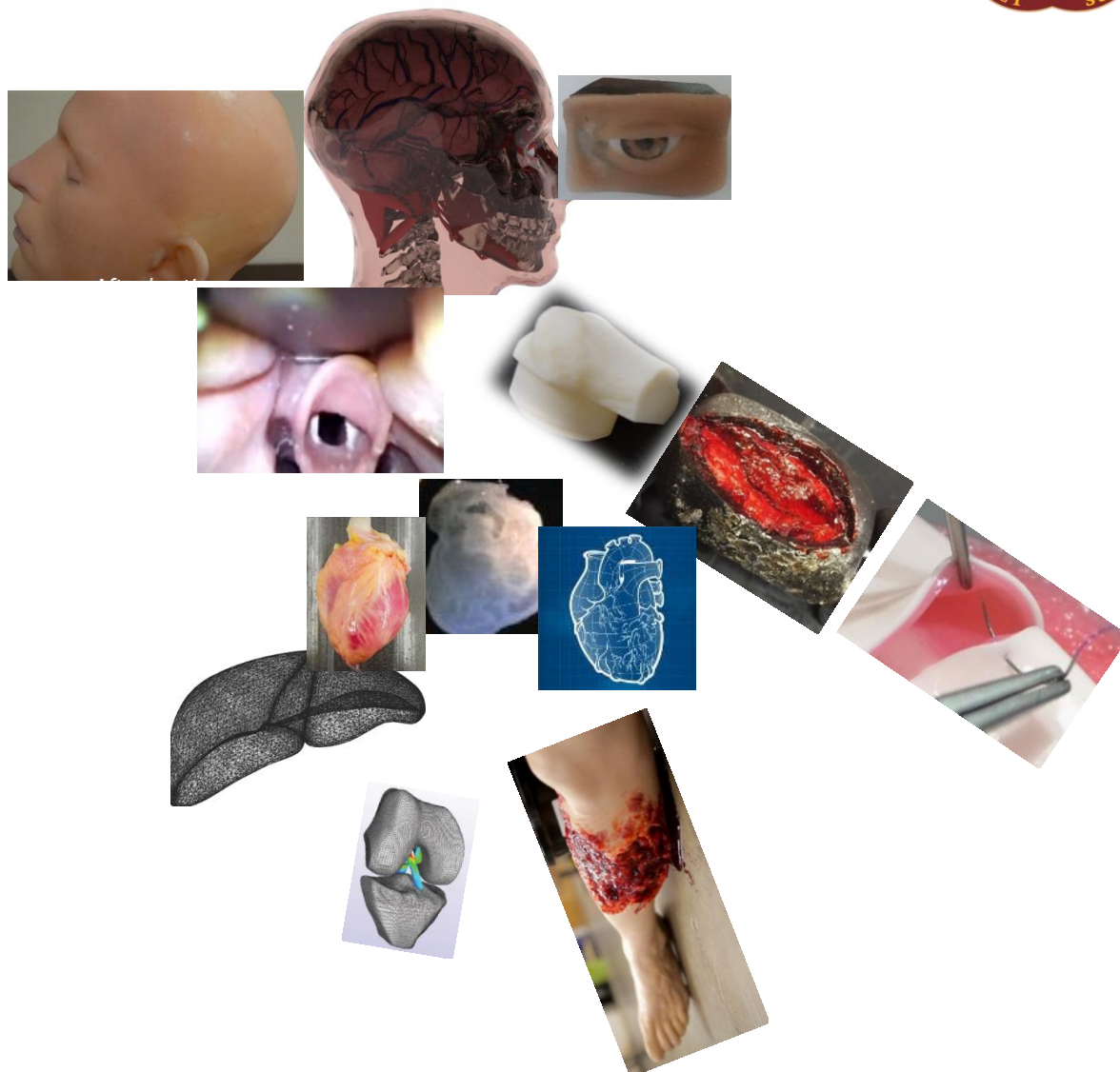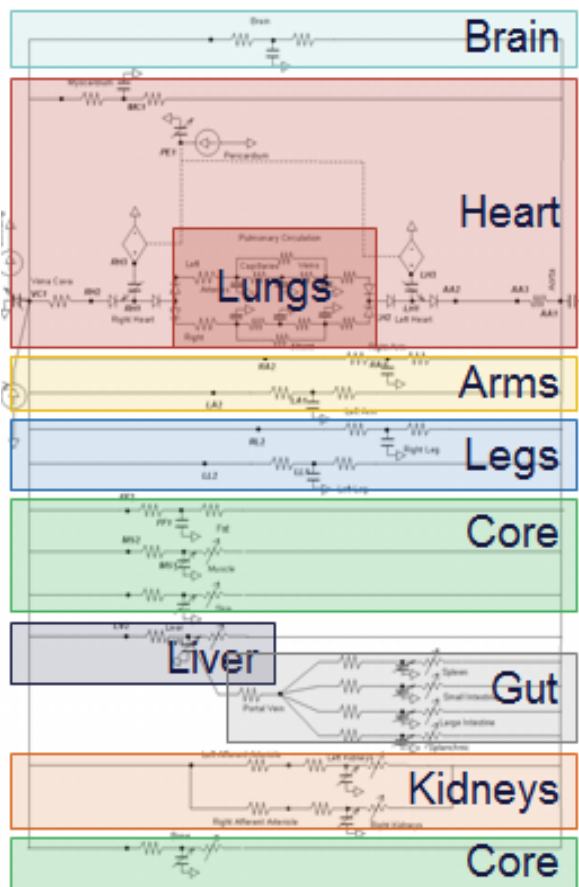
Program Concept Graphic

Task Area: Med Sim (POINTS)

Optimizing the "Platinum 10 Minutes"

Deliver Individual Training Course

On Demand:

Live Virtual Constructive Gaming

First Responder

Combat Medicine

Medical Readiness Training

Enhance Warfighter Learning, Communications and Decision Making

Upgraded, Networked and New Training Sites & Point of Demand Training

Quadruple Aim – Medical Readiness

➤ POINTS

- o Independence from central training sites allowing for more some autonomy yet standards at regional sites

- o Independence from limited trainers and other training assets. FTEs are one of the highest cost for military training

- o Adaptable, modular, and customizable training

- o Systems of systems to optimize efficiency/effectiveness

- o Predicting training needs in advance to assist the trainer

- o Train and maintain a capable and ready force at the point of demand for point of injury/ combat casualty care.

Program Concept Graphic

Task Area: Med Sim (MFR)
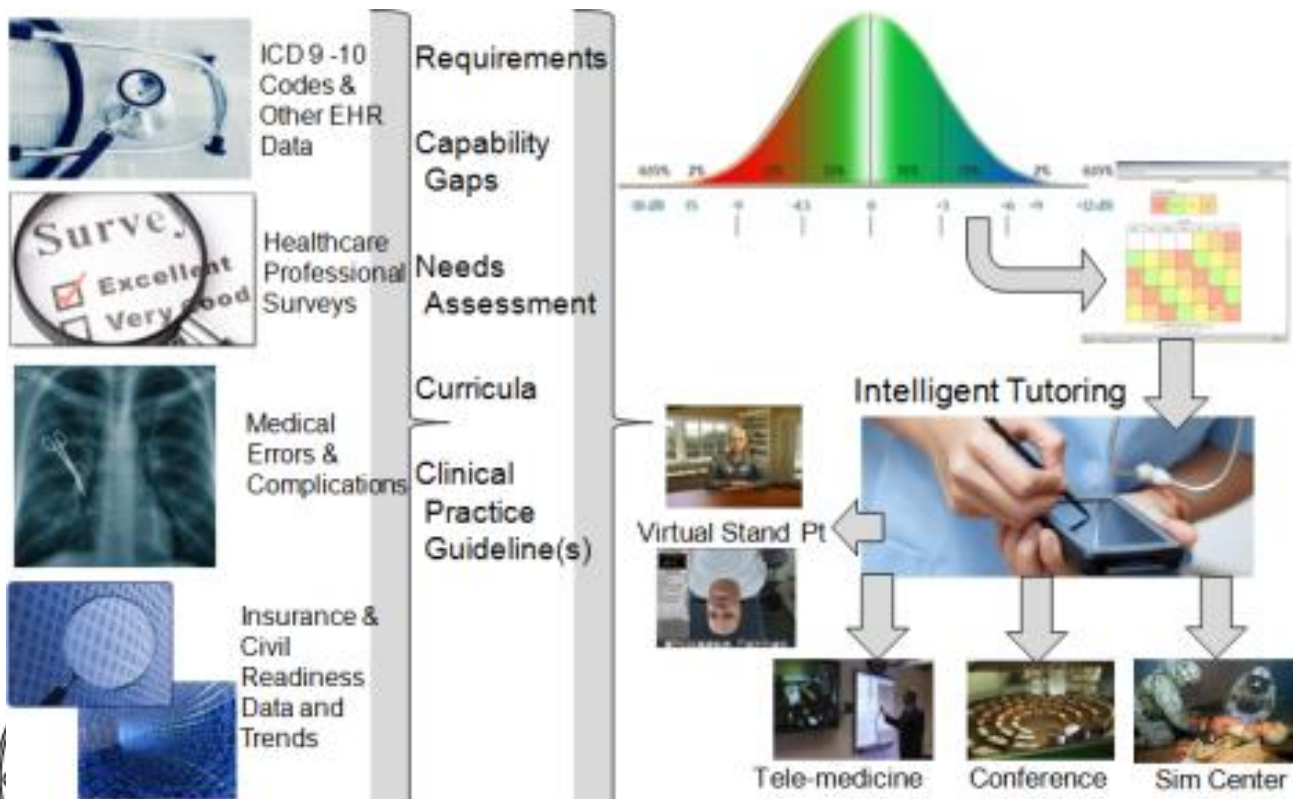
Medical Readiness

➤ Medical Force Readiness

- o Develop and evaluate a predictive (cognitive and psychomotor) model (algorithm) to assess decay of healthcare related skills

- o Initially will address need to assess in-theatre skills prior to deployment

- o Provide accurate and appropriate cognitive and psychomotor predictive models of healthcare providers so the force receives the most effective care possible

- o Accurately and appropriately align effective and efficient training models vs. identified skills lost

Medical Deputies Action Group (MDAG)

USD AT&L

DHA HIT

DHMS PEO

Functional Champions Leadership Group* (FCLG)

eMSM Leadership Group

Medical Operations Group (MOG)

Medical Business Operations Group (MBOG)

Manpower and Personnel Operations Group (MPOG)

DMIX | DHMSM | IPO | JOMIS

EHR

MHS Genesis

Hosted By Cerner

Current & Future Theater IT Systems

Functional Advisory Council (FAC)

Clinical Portfolio Management Board (CPMB)

Readiness & Force Support Portfolio Management Board (R&FSPMB)

Business Portfolio Management Board (BPMB)

HIE WG | BPM WG

TSWAGs | DDWG

TFWG

Sanctioned tri-service working groups

FC Leadership Group:
Chair: Dr. William Roberts
Army: MG Peggy Wilmoth
Air Force: Maj Gen Roosevelt Allen
Navy: CAPT Dan Zinder

BPM WG – Business Process Management WG
HIE WG – Health Information Exchange WG
DDWG- Design Decision Working Group
TSWAG – Tri-Service Workflow Advisory Group
TFWG- Theater Functional Working Group

TSWAGs: 29 groups aligned to Cerner EHR.
300+ Army SMEs working standardization of business and clinical processes
Work started March 2015, TSWAGs are ongoing
DDWG: Make high level/enterprise design decisions. Army reps: 1 MD, 1 RN, 1 PAD, 1 Quality/Safety

Timeline: 2008 — 2010 — 2012 — 2016-17

Data Consolidation

- USAFSAM
- DataDev
- DataProp
- COHORT
- AFCHIPS

$ $ $ $

- DataProd
- COHORT
- AFCHIPS

$ $

- HSDW
- COHORT
- AFCHIPS

$ $ $

- Real Time
- Stage
- Data Warehouse
- Discovery
- MDM and MetaData

$ $ $

Hosting Consolidation

- Brooks AFB x 2
- Commercial x 2
- Skyline

$ $ $

Cloud Service

Cloud TBD per Research

$ $

The Driving Use Cases for the data consolidation and technical architecture

1. **Data Discovery** – turn massive volumes of data into focused digestible patterns and relationships

2. **Business Intelligence & Dashboarding** Users interact with common, authoritative data source that provides easily accessible reporting of a single, consistent version of the truth

3. **Medical Research**

4. **EHR Bi-Directional data sharing**

The Driving Issues for pursuing new hosting, compute & storage models:

1. **Cost** – too expensive
2. **Scalability & Capacity** – demand outpaces supply
3. **Partnerships with VA, Academia, and Industry**
4. **Analytical Processing Speed** – more analysis done/analyst hr.
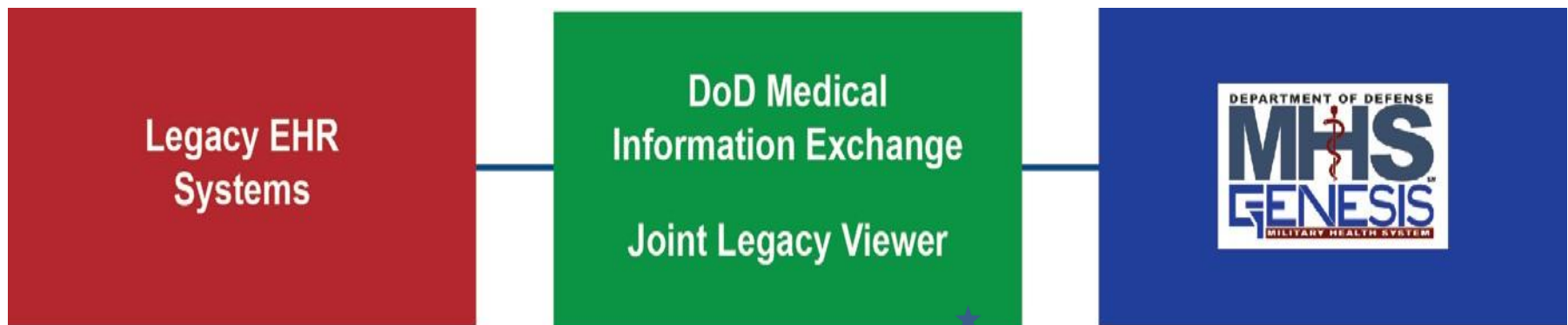
- Integrated inpatient and outpatient EHR to replace select DoD legacy healthcare systems
- Interface with select legacy systems to meet the unique needs of the military
- Commercial off the shelf solution consists of Cerner Millennium and Henry Schein's Dentrix

| Legacy EHR Systems | DoD Medical Information Exchange
Joint Legacy Viewer | DEPARTMENT OF DEFENSE
MHS GENESIS
MILITARY HEALTH SYSTEM |

★ Transitioned HIT Research Product

Levels of Care

Role 1
Combat Casualty
First Responder
Medic/Corpsman

Role 2
MEDEVAC
Aid Stations
Medical Capabilities
Afloat
Forward Surgical Teams

Role 3
In Theater Hospital
Combat Support Hospitals
Hospital Ships
Expeditionary Medical
Facilities

En route Care
Patient Staging Facilities
Critical Care Air Transport
Teams
"Care in the Air"

Roles 4/5
Military Treatment
Facilities
Private Sector
Department of
Veterans Affairs

Program Management Office

JOMIS/TMIP-J → DHMSM®
MHS GENESIS

DMIX
JLV

IPO Standards (Policy)
VA & HIE

★ Transitioned HIT Research Product

HITI Research Domains and Subtasks

**JPC-1
(Health IT and Informatics)**

Technologies and Data Management for:

Theater/Operational Medicine
- Joint Casualty Management
- Joint Patient Movement
- Medical Command & Control
- Medical Logistics & Infrastructure Support
- Health Surveillance, Intelligence, Preventive Medicine
- Human Performance Enhancement

Military Health Care Services
- Readiness-centric Patient Engagement/ Activation
- Patient Safety-driven Medical Device Information & Systems Interoperability
- Connected Health Care Services

Information Technology Infrastructure and Data Management
- Health Data Management/Big Data/Analytics
- HIT Infrastructure

Medical Resourcing
- Medical Personnel Resource Planning and Allocation
- Education and Training
- Financial – Materiel Data Management

Major Changes in FY16:
- The FY16 R&A provided guidance to focus on **Theater/Operational Medicine/**militarily relevant research
- Addition of Informatics to focus
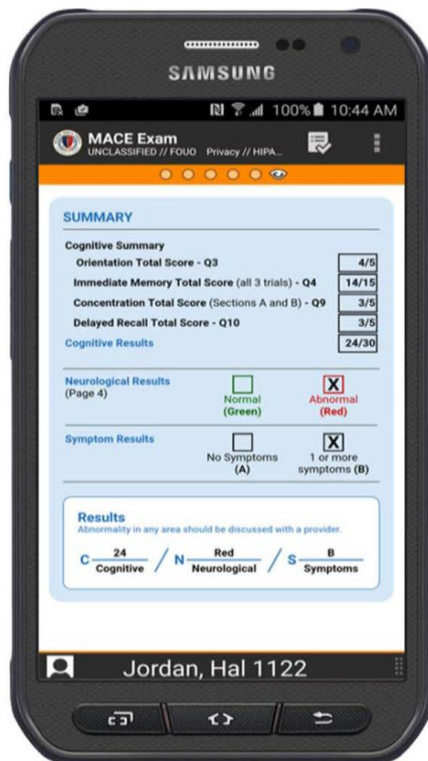- Research initiatives were reprioritized and updated to synch with documented capability gaps/priorities

DOD Approved First Responder Tool
Mobile Computing Capability

- **DD 1380 TCCC * SF 600 Sick Call * eMACE (PH-TBI)**

Program Title: Theater Operational Medicine Reach

Program Concept Graphic

- ✓ JOMIS EHR data
- ✓ MHS Genesis EHR data
- ✓ Audio/Video data
- ✓ Synchronous/Asynchronous (S/A) Data *(Live Data/Store and Forward Data)*
- ✓ Provide data needed by JTR to improve DTE/Trauma outcomes
- ✓ Medical Logistics Data/Technology
- ✓ Genomics HIT for Theater Use

Incr 1
Bi-directional Data Exchange from Point of Injury to EHR/JTR

Incr 2
S/A Bi-directional Data Exchange storage and mgmt. from Point of Injury to EHR/JTR

Incr 3
S/A Virtual Health & Near Real-time autonomous Data Exchange from Point of Injury to EHR/JTR

GOAL - ADVANCE REACH CAPABILITY:
MILITARY MEDICAL EXPERTISE EXPORTED GLOBALLY TO AND FROM ALL ROLES OF CARE WHERE AND WHEN NEEDED

Data Capture, Data Transfer and Data Exchange Challenges Addressed:

| Security to NIPR data exchange | SIPR | No/Low Comm. Environment Technology Usability | Hands-Free EHR Data Entry Technology Mobility | Defense Medical Logistics adopt industry best practices |

➢ Reach

- o Improve documentation of care in Theater/Operational Medicine Environments by advancing hands-free/passive data capture/transfer in theater

- o Advance technology solutions to support capturing and integrating data into MHS systems for theater/operational medicine to support prolonged care in place, autonomous and closed loop systems

- o Generation, capture, integration, and transmission of medical and non-medical data from multiple sources to the correct data repository (MHS Genesis, Joint Trauma Registry, Personal Health Record, Leadership Command and Control) over multiple military/DoD/MHS systems

Program Concept Graphic

Task Area: HITI (Agility/Med Intel)

Disparate Theater Data transformed into...

- Medical Devices data
- Environmental Sensors data
- Wearable Body Sensors data
- JOMIS Theater Electronic Health Record Data
- More Data sources
- MHS Genesis Electronic Health Record Data
- Genomic data
- Allergies data
- Joint Trauma Registry/ Defense Trauma Enterprise Data
- Medications data
- Nanotechnologies data
- Vital Signs data
- Blast sensors data

...Actionable Medical Intelligence

Increment 1
Non-medical (sensors, wearables, environmental) Data Integration, Mgmt., & Analytics Integrated with Medical Data

Increment 2
Big Data Analytics/Decision Support & Usability Research for Near Real-Time Readiness/Medical Intelligence for Theater

Increment 3
Solutions for Big Data Integration and Analysis of Medical Data for Predictive Medical Intelligence in Support of Care in Theater

Theater/Operational Medicine Agility/Medical Intelligence Technical OV Graphic
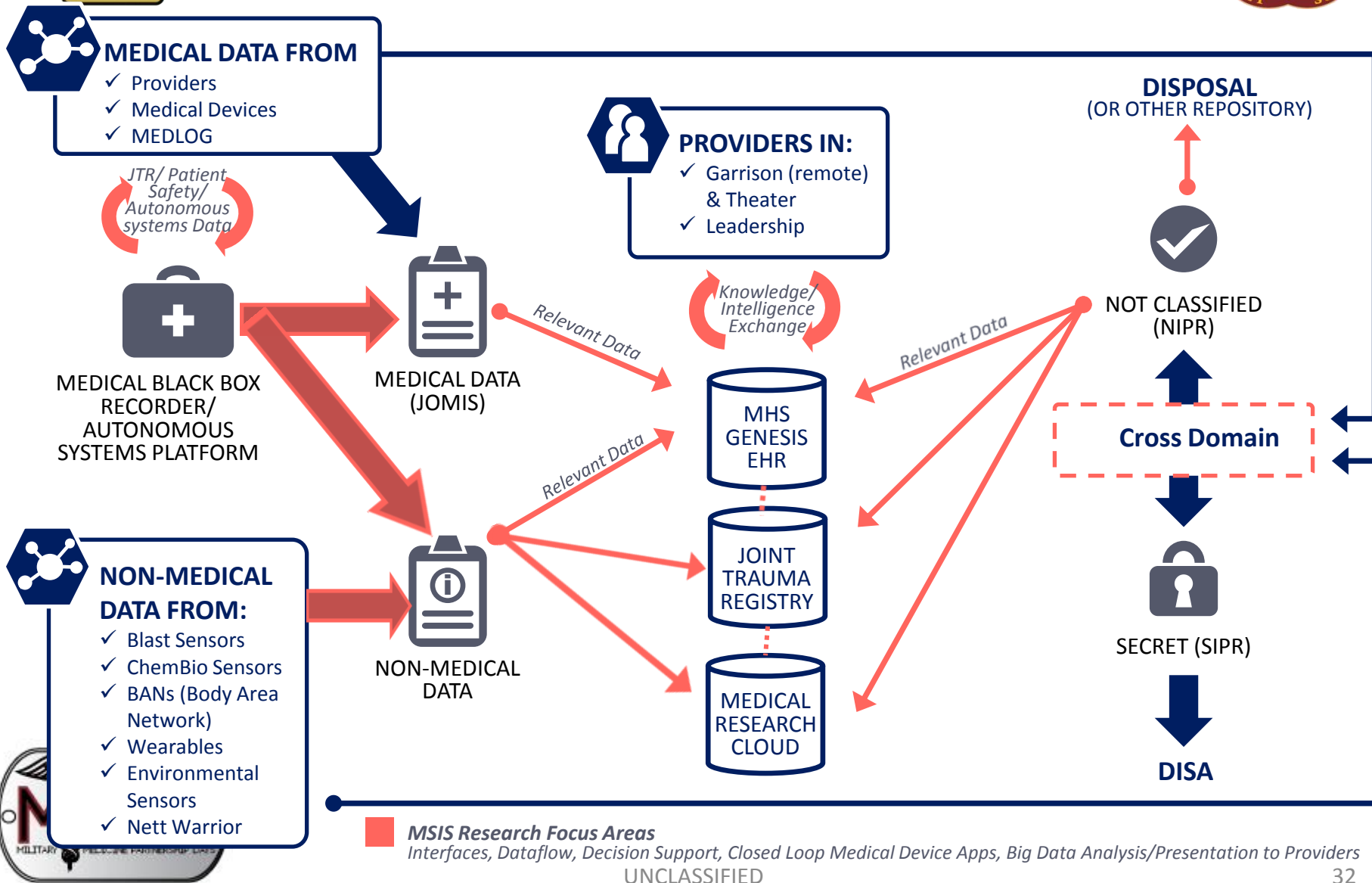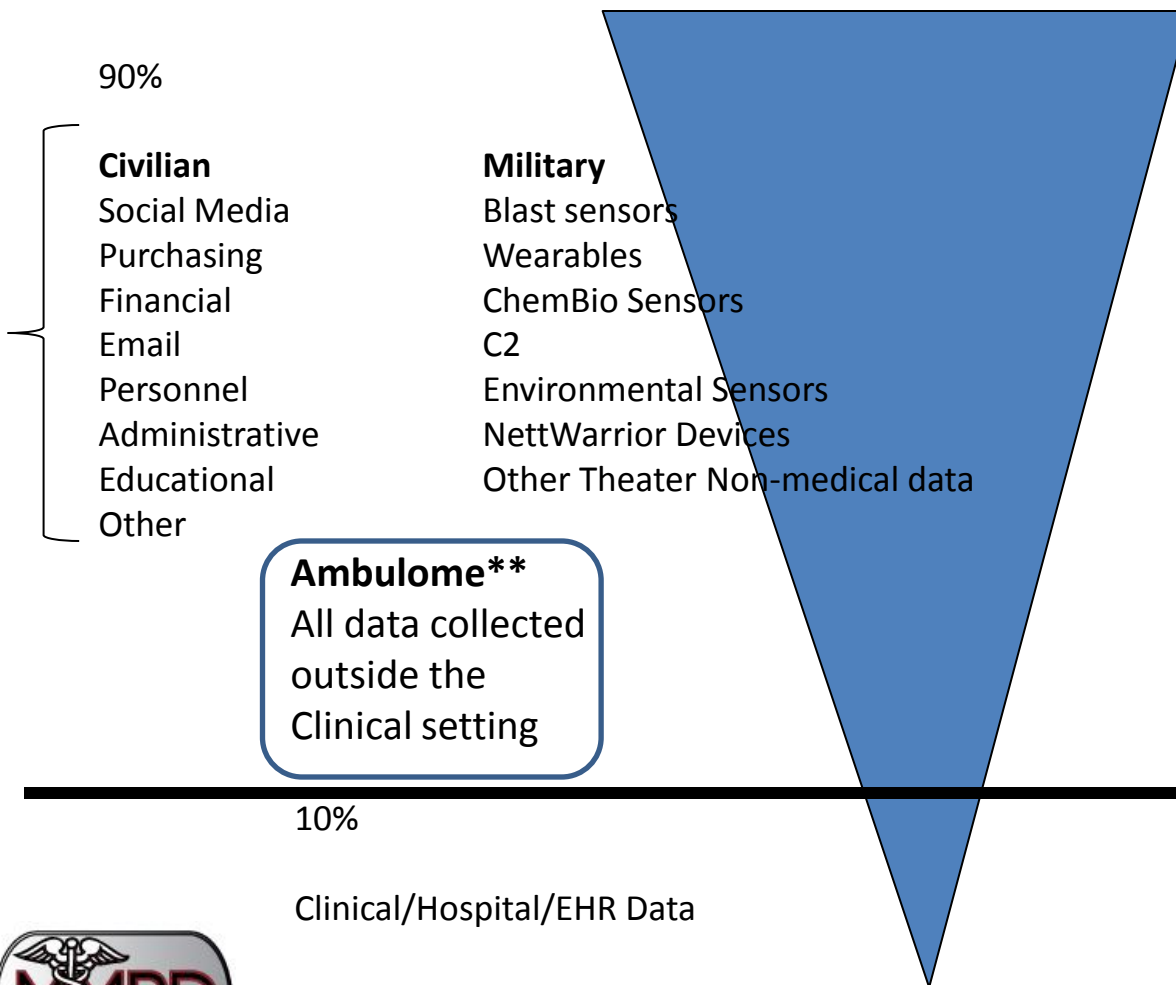
How much do we really know about our patients??
Average human will generate 1100 TB of data in their lifetime*

90%

Civilian   **Military**
Social Media   Blast sensors
Purchasing   Wearables
Financial   ChemBio Sensors
Email   C2
Personnel   Environmental Sensors
Administrative   NettWarrior Devices
Educational   Other Theater Non-medical data
Other

Ambulome**
All data collected outside the Clinical setting

10%

Clinical/Hospital/EHR Data

*Shahram Ebadollahi, IBM Watson
** John Sotos, Intel
Nov 9, 2015 HIMSS Connected Care Conference

Volume (amount of data)
Velocity (speed of data in and out),
Variety (range of data types and sources)

From Data to Actionable Knowledge

Acquire
- Can be multiple sources
- Quality of source / data
- Exceptions
- Data steward
- Always keep the raw data

Stage
- Curation
- Normalization
- Aggregation
- Integration
- Move data 1 time
- Data "lands" in the right place

Transform
- Trend analysis on data
- Volume analysis
- Data rationalization
- Statistical analysis
- STANDARDS

Validate
- METADATA
- Lineage
- Audit
- Time stamps
- Volumetric
- Element correlations
- Data dependencies
- Classes of i

Deliver
- KNOWLEDGE from data
- Trend analysis
- Repeatability
- Data mart
- Virtualization
- Ad hoc

Service Level Agreements (SLAs)

Data Use Agreements (DUA)

GOVERNANCE

User Roles - Role based Access

DATA SECURITY

Datalog – who queried what and when

➢ Agility / Med Intelligence

- o Utilize data and analytics to derive medical intelligence for theater providers and patients to use at the right time at the right location for the patients' needs

- o Determine best presentation and interaction experience for users to acquire medical intelligence

- o Analysis, integration of medical and non-medical information from multiple sources to the correct data repository (EHR, Joint Trauma Registry, Personal Health Record, blast/environmental sensors, body sensors, Leadership Control and Command) over multiple military/DoD systems, and return actionable medical intelligence to providers/decision makers

For additional questions after the conclusion of the conference, send an email message to:

usarmy.detrick.medcom-usamrmc.mbx.mmpd@mail.mil