Surgical Critical Care Initiative (SC2i): Leveraging iRODS to Accomplish Multi-Site Data Collection, Harmonization, and Analytics to Generate Clinical Decision Support Tools

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USU Uniformed Services University | SC2i Surgical Critical Care Initiative

USU Uniformed Services University · Walter Reed National Military Medical Center · DukeMedicine · Emory University School of Medicine · DecisionQ · hjf Henry M. Jackson Foundation for the Advancement of Military Medicine

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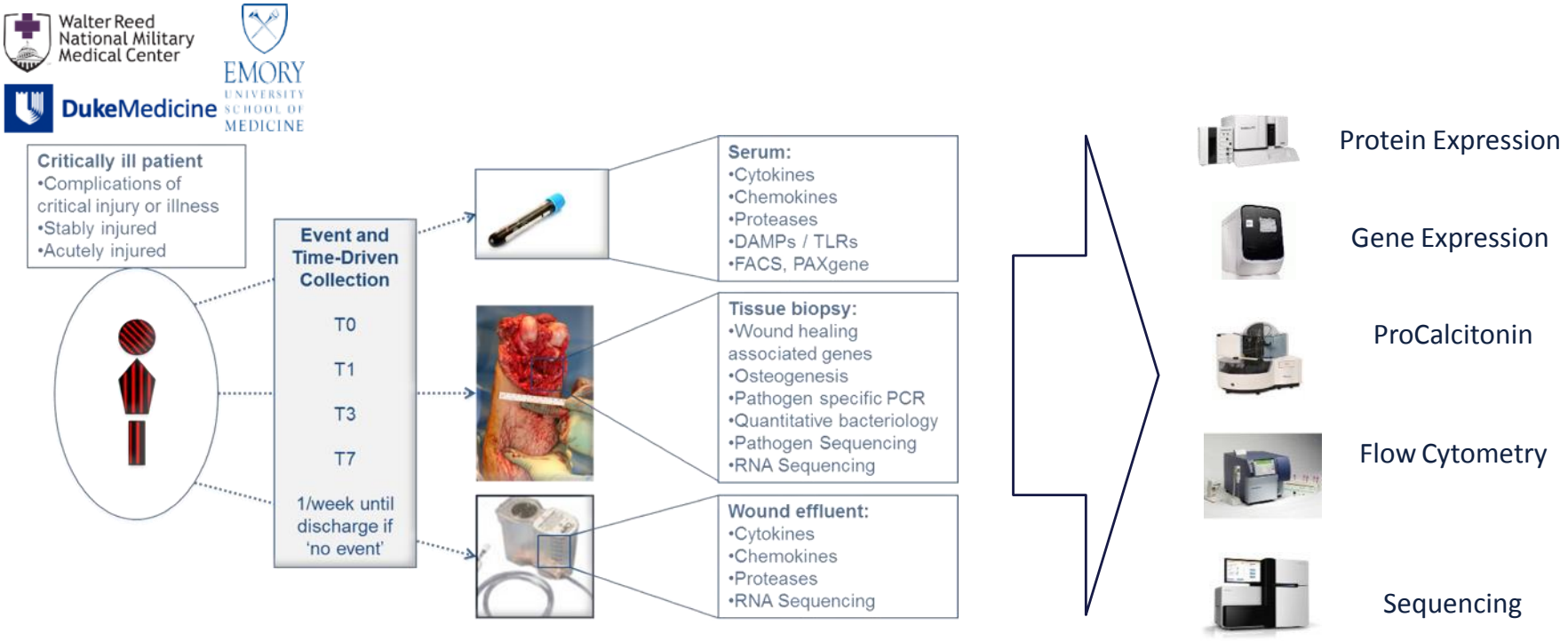
Surgical Critical Care Initiative (SC2i)

FUNDING SOURCE – STRUCTURE – REPORTING	DUAL FOCUS
Funded by DOD Launched in 2013 and designated as a USU Center in 2016 A Federal / Non-Federal partnership Biannual Oversight Meetings	Leveraging clinical and -omics data to develop 'precision' CDSTs in the acute care space Improving outcomes and lowering costs in both military and civilian systems

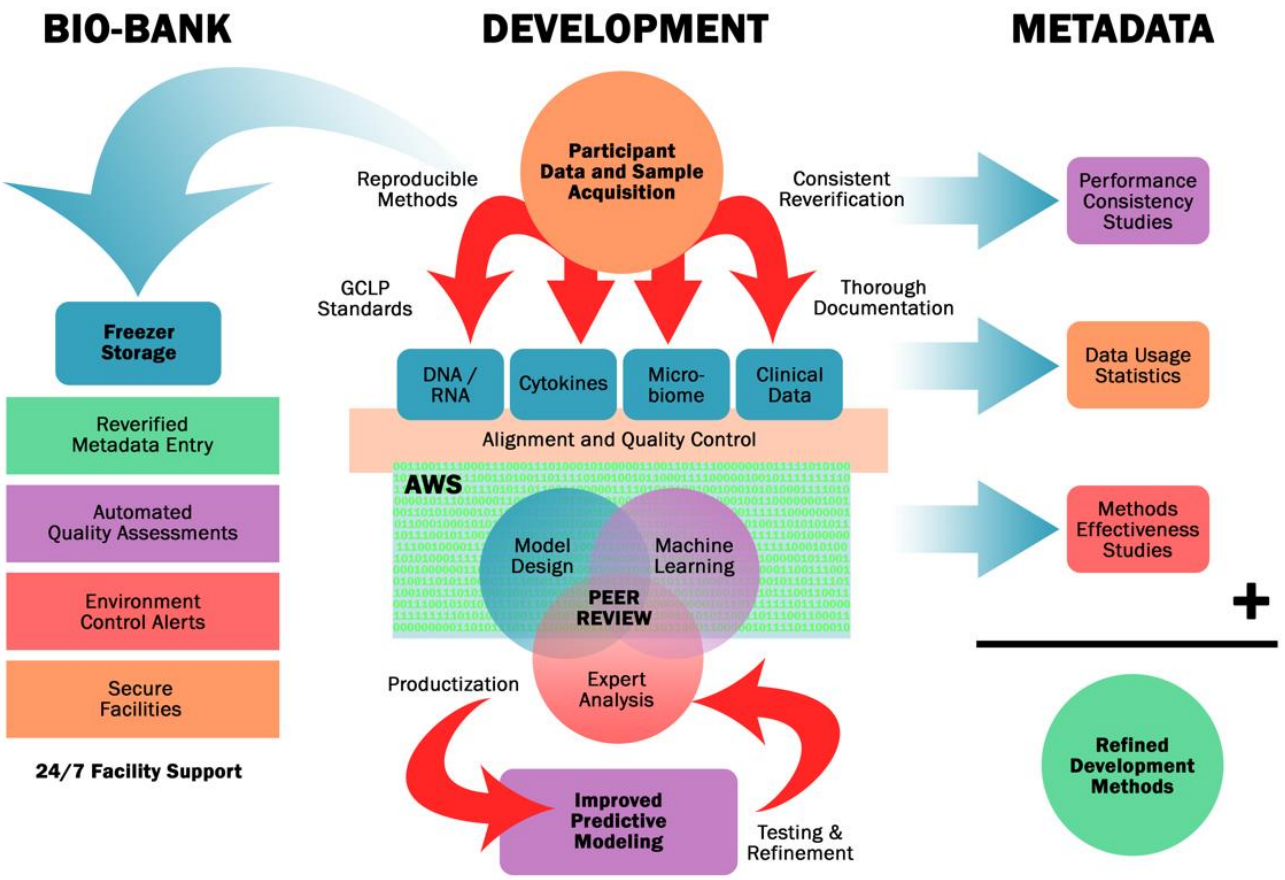
Gap Addressed in Critical Care

- Problem: Management of battle injured and civilian trauma and surgical patients remains largely dependent upon traditional (visually-guided) clinical decision-making.
- Solution: Develop decision support tools using evidence-based clinical data together with cutting-edge science in the understanding of physiological, psychological, and physical factors that govern the body's response to trauma to guide management of surgical care.

Standardize Data Collection

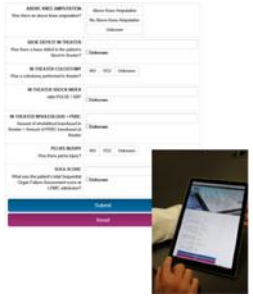


Data Workflow

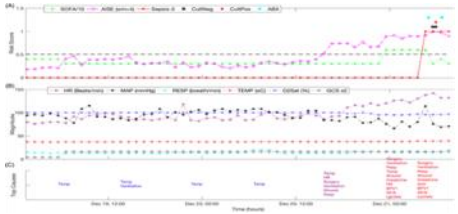


Clinical Decision Support Tools

MTP app guideline developed
In-use @ Duke & Emory/Grady
Deploying @ Upenn
Building database to track clinical utility



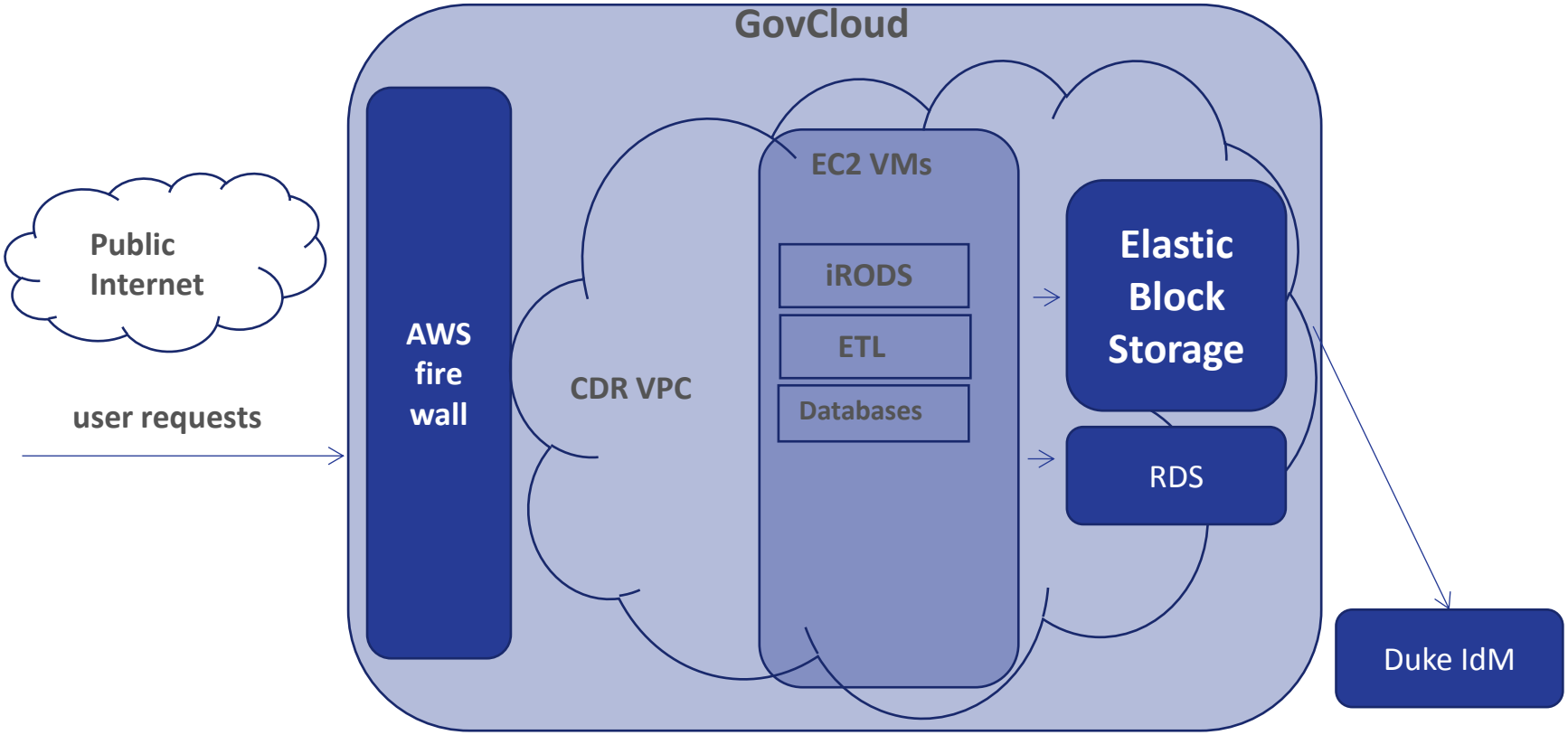
In JTS-CPGs / In-use @ WRNMMC
Used on 22 combat traumas
Building database to track clinical utility



Deployed @ Emory
Deploying @ Grady
Building database to track clinical utility

CDSTs in-development	Anticipated deployment
Appendectomy	FY21
WounDx™	FY23
OA Dx	FY23
VTE Dx	FY23
Pneumonia Dx	FY24
Bacteremia Dx	FY24
sTBI Dx	FY24
AKI Dx	FY24
HO Dx	FY25
ARDS Dx	FY25
SBO Dx	FY25

Amazon Web Services GovCloud Architecture



iRODS Authentication

- Users are authenticated with Shibboleth with two factor authentication
- Once authenticated via Shibboleth, users are automatically created in iRODS.

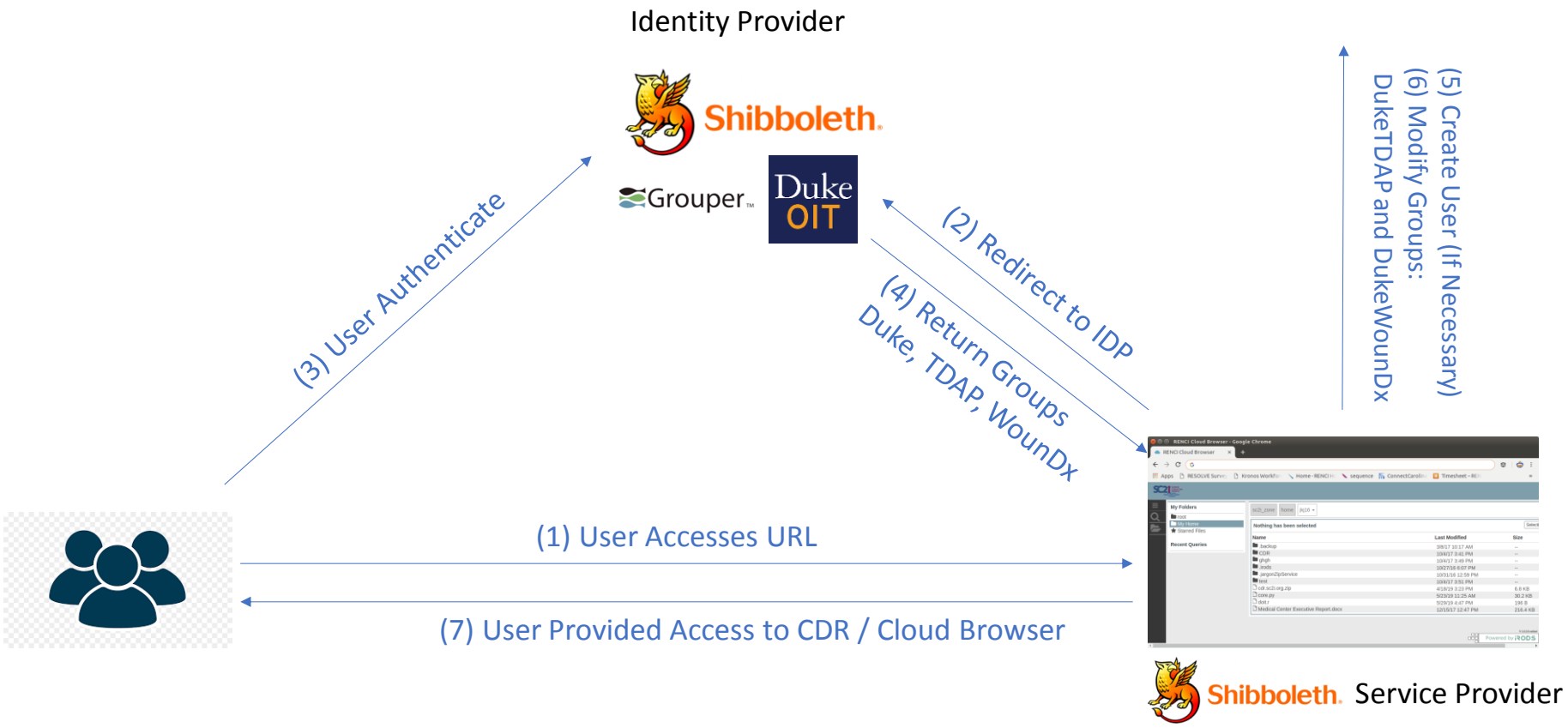
iRODS Authorization

- Users are assigned to groups in Grouper (https://www.internet2.edu/products-services/trust-identity/grouper/)
- When a user logs into CloudBrowser, groups in iRODS are created or updated as needed for each study/site combination.
- Users belong one or more groups in the following categories:
  - Studies (example: WounDx, TDAP, OpenAbdoment, ...)
  - Sites (Duke, Emory, WalterReed, NavalMedicalResearchCenter)
- Authorization on iRODS objects requires access to a study and site.
- iRODS groups were created for each combination of site/study.

  Examples:

  - TDAPDuke
  - WounDxEmory

Example Authentication/Authorization



iRODS Rules

- Python rules perform the following tasks:
  - Determine if ingested files are of interest (based on file name and location)
  - Validates and loads input data to a back end database
  - Periodic delay rule determines if new output generation is required; validates and generates new output files
  - Policy enforcement points are used to log all interactions for auditing purposes.

iRODS Metadata

- Progress of data loads is stored in metadata. This includes:
  - The validation and load status for input files
  - Time of last input data submission and output generation (for each study)
  - Progress of output file generation and validation