The Future on FHIR

- CIBMTR Reporting APP

Bill Burgess: Business Architect – CIBMTR IT
Bob Milius : Principal Research Scientist – CIBMTR IT

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Overview

- Who we are and what we do.
- Outline the current data collection and its challenges.
- Introduce HL7 FHIR Resources.
- The CIBMTR Reporting App for Epic using FHIR.
- Where we are headed next.

BE THE MATCH®

Our mission:
We save lives through cellular therapy

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

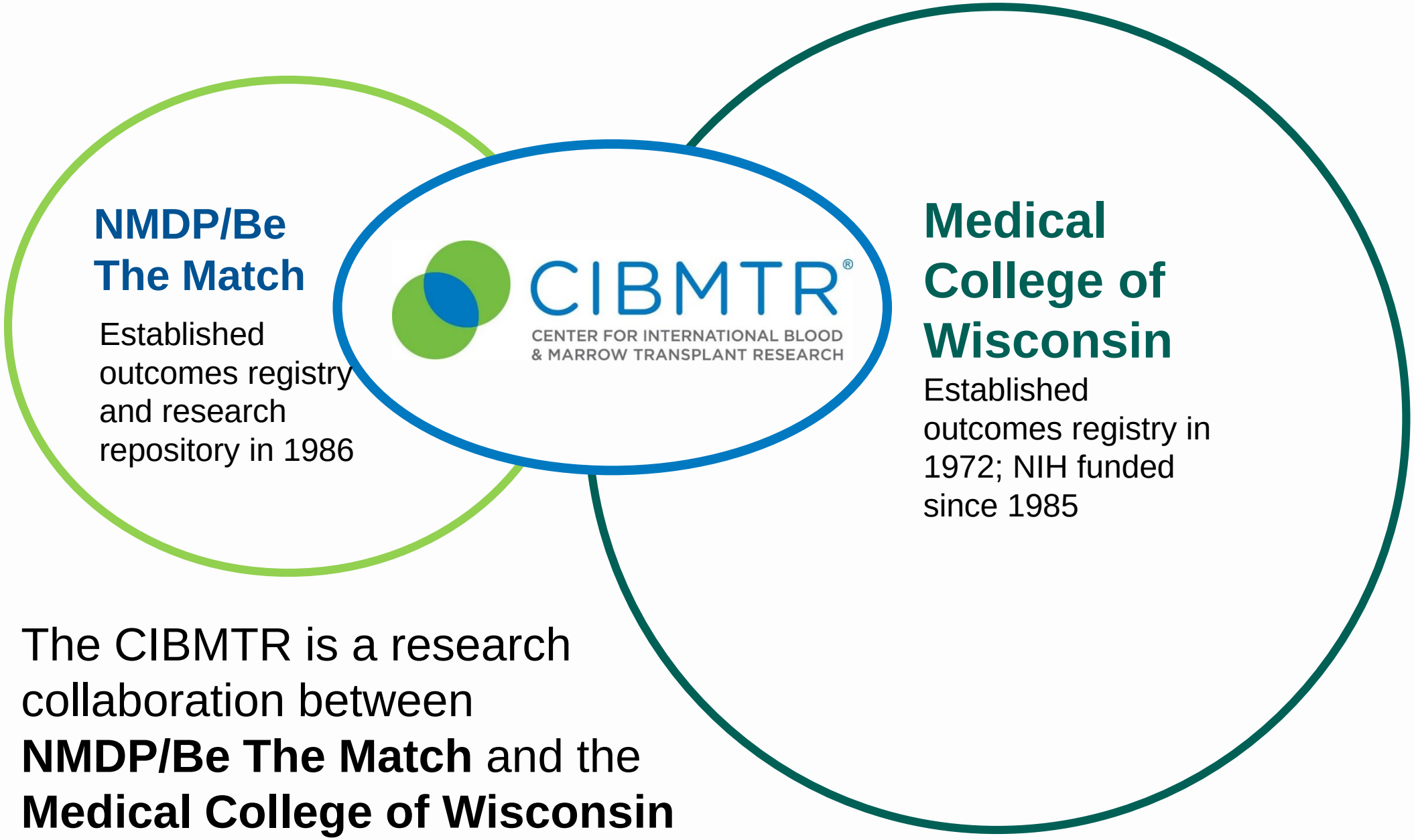
What we do?

- For those suffering from a blood cancer like leukemia or lymphoma or those suffering from a blood disease like sickle cell anemia **a cure exists**. Most of these patients are in need of a blood stem cell transplant from either a related or unrelated donor. For those who do not have a match in their family they turn to Be The Match.
- Be The Match operates the world's largest and most diverse volunteer donor registry
- Be The Match facilitates transplants by 3 different types of cell sources
  - Marrow
  - Peripheral Blood Stem Cells (most common)
  - Umbilical Cord Blood
- Since 1987 BTM has helped facilitate more than 97,000 transplant
- In 2019 we facilitated nearly 6,600 transplants

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Our Network

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD
& MARROW TRANSPLANT RESEARCH



The CIBMTR is a research collaboration between **NMDP/Be The Match** and the **Medical College of Wisconsin**

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Research

RESEARCH STUDIES IN PROCESS

We conduct research through our research program, CIBMTR® (Center for International Blood and Marrow Transplant Research®), in collaboration with the Medical College of Wisconsin (MCW). Our research leads to more lives saved and an enriched quality of life for thousands of patients.

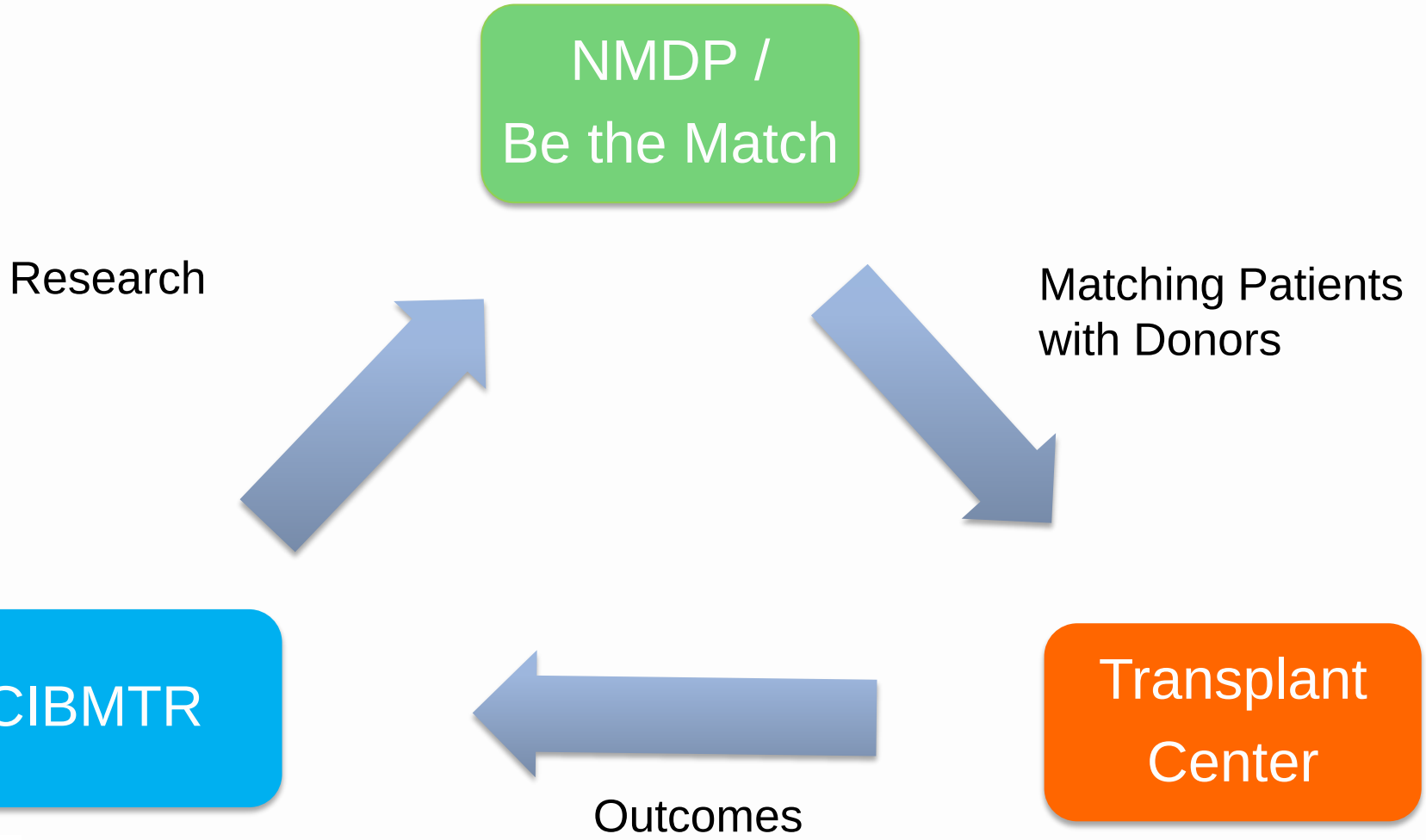
MORE THAN

200

RESEARCH STUDIES UNDERWAY

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Research Data Flow



CIBMTR®
CENTER FOR INTERNATIONAL BLOOD
& MARROW TRANSPLANT RESEARCH

Numbers of Patients Reported by Year

	Transplant Essential Data (TED)	Comprehensive Report Forms (CRF only)	Cellular Therapy Transplant Essential Data (CTED)
TOTAL	69,232	15,099	2,474
2016	24,282	5,464	587
2017	25,340	5,089	1,072
2018*	19,610	4,546	815

*Patients continue to be registered for 2018; Data are incomplete

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

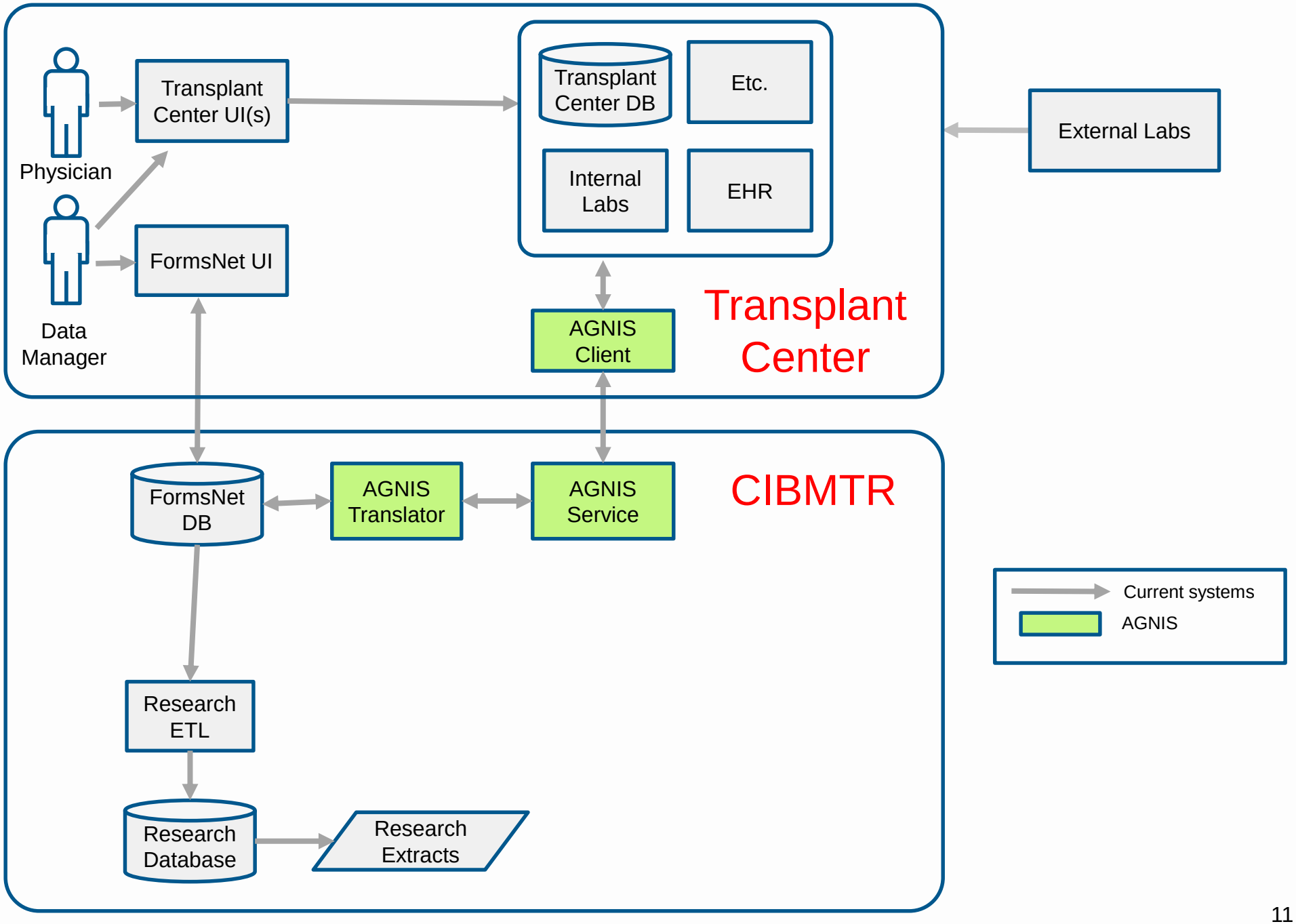
Completed **Forms** 2017-2019*

All Sections

	2017	2018	2019
Center Type	Count of Forms	Count of Forms	Count of Forms
Apheresis Centers	3047	3250	1926
Collection Centers	1035	964	458
Donor Centers	77303	78747	52325
Transplant Centers	297871	317653	214299
Grand Total	**379256**	**400614**	**269008**

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

High Level Overview



CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

The Problem We Are Trying To Solve

- Data Managers are not medical experts but have to interpret the data
- Data is often found in federated systems
  - Transplant centers store the same data in different systems and formats
  - EHR, transplant databases, Lab systems
- We expect more and more complex data, e.g. molecular sequences.
- Mapping burden - mapping center data points to CIBMTR forms for electronic data submission is time consuming.
- Form Revisions – Forms are frequently changing to keep up with science

How Do We Attack This Problem

- Use of widely accepted health care standards for exchanging data
- Standards that are supported by existing healthcare applications, e.g.: EHRs
- Collect data that are mapped to establish healthcare standards, LOINC, SNOMED, caDSR
- We don’t want to reinvent the wheel

Health Care Related Standards

Type of Standard	Description	Examples
Terminologies and Ontologies	Definitions concepts and their relationships; Used to construct data elements and value sets	SNOMED, **LOINC**, RxNORM, **MedDRA, NCI Thesaurus**
Data Elements (variables)	Detailed description of how a data point should be captured including: definition, data type, max length, allowed values	**caDSR, ISO 11179, CDISC CDASH**, CDISC SDTM
Data Models	Organize data elements based on defined domains such as Patient, Labs, Treatment; Similar to database structure	**BRIDG**, OMOP (OHDSI), Sentinel, i2b2, PCORNet, ***FHIR Profiles***
Collections of Data Elements	Collection of data elements for a specific purpose; Include data elements from multiple domains; Frequently used to represent the minimum info needed for a purpose	**US Core, mCODE, Registries on FHIR**, FHIR IGs

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

HL7 FHIR and Resource Examples

The CIBMTR® (Center for International Blood and Marrow Transplant Research®) is a research collaboration between the National Marrow Donor Program® (NMDP)/Be The Match® and the Medical College of Wisconsin (MCW).

Health Level 7 International

- Non-profit, ANSI-accredited healthcare Standards Developing Organization (SDO)

- *“HL7 provides standards for interoperability that improve care delivery, optimize workflow, reduce ambiguity and enhance knowledge transfer among all of our stakeholders, including healthcare providers, government agencies, the vendor community, fellow SDOs and patients”*

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

HL7 asked a question...

What would healthcare exchange look like if we started from scratch using modern approaches?

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

- Newest standard
- FREE!
- History
  - 2011 Proposed
  - 2012 First version
  - 2017 Standard for Trial Use 3
  - 2018 Release 4
    - Normative
- Aligns with REST services
  - XML, JSON

- Active Testing
  - Three Connectathons a year
  - 22nd in Sep 2019 (7+ yrs)
- Immense interest
  - Argonaut
    - vendor initiated project
    - Epic, Cerner, MEDITECH, Athena, McKesson, Mayo, Intermountain, Partners, etc.
  - ONC
    - Sync For Science
    - Sync For Genes
  - ASCO workshops

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Federal Government Rules for Consumer Access

ONC Information-Blocking Rule

- Establishes that data sharing among providers, patients, and health plans can only be prevented in excepted cases
- Defines information-blocking exceptions
- Establishes that FHIR APIs are the mechanism for such exchange
- Expands the information that must minimally be shared (USCDI)
- Regulates API pricing
- Sets fines on providers and vendors for violations

CMS Interoperability Rule

- Requires gov't associated health plans to make available to patients FHIR-based APIs
- Strongly encourages private plans to do the same
- Allows patients to permit access to 3rd parties, such as providers
- Allows patients to direct that plans share their data in event of plan change
- Requires that Medicare Advantage plans participate in "trusted exchange networks"

ONC Trusted Exchange Framework Rule

- Establishes a national governance and policy framework for clinical data-sharing networks
- Establishes an organization to set and enforce policies

Source:

MAeHC
Massachusetts eHealth Collaborative

CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

HL7® FHIR® is used by...
Project Argonaut

"The purpose of the Argonaut Project is to rapidly develop a first generation FHIR-based API and Core Data Services specification to enable expanded information sharing for electronic health records and other health information technology based on Internet standards and architectural patterns and styles."

http://www.healthcareitnews.com/news/epic-cerner-others-join-hl7-project

Healthcare IT News TOPICS SIGN UP

HL7

Epic, Cerner, others join HL7 project

Top vendors and providers join forces to spur standards-based interoperability

By Mike Miliard | December 05, 2014 | 11:17 AM

Health Level Seven International has launched the Argonaut Project – a collaborative comprising healthcare heavy-hitters such as Epic, Cerner, MEDITECH, Mayo Clinic, Intermountain and Partners HealthCare – to speed the development and adoption of HL7's standards framework, FHIR.

As it works to spread FHIR – it's pronounced "fire," and stands for Fast Healthcare Interoperability Resources – HL7's Argonaut Project touts the participation of blue chip EHR developers, health systems and research groups, including:

[See also: Interoperability is 'impossible in the abstract']

- athenahealth
- Beth Israel Deaconess Medical Center
- Cerner
- Epic
- Intermountain Healthcare
- Mayo Clinic
- MEDITECH
- McKesson
- Partners HealthCare System
- SMART at the Boston Children's Hospital Informatics Program
- The Advisory Board Company

FHIR is billed as a next-generation framework that makes use of the latest Web-based standards, with a focus on putting them to work in healthcare interoperability. HL7

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

So… what exactly is FHIR?

Resources

- “Resources” are:
  - The "R" in "FHIR"
  - Small logically discrete units of exchange
  - Defined behaviour and meaning
  - Known identity / location
  - Smallest unit of transaction
  - “of interest” to healthcare

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

What's a Resource?

Examples

- Administrative
  - Patient, Practitioner, Organization, Location, Coverage, Invoice
- Clinical Concepts
  - Allergy, Condition, Family History, Care Plan, Observation, Specimen, DiagnosticReport
- Infrastructure
  - Document, Message, Profile, Conformance

Non-examples

- Gender
  - Too small
- Electronic Health Record
  - Too big
- Blood Pressure
  - Too specific
- Intervention
  - Too broad

100-150 total - ever

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

http://www.slideshare.net/DavidHay5/introduction-to-fhir-new-zealand-seminar

1.2 Resource Index

FHIR Infrastructure Work Group	Maturity Level: N/A	Standards Status: Informative

This page is provided to help find resources quickly. There is also a more detailed classification, ontology, and description. For background to the layout on the layers in this page, see the Architect's Overview. See also the abstract Base Resources Resource and DomainResource.

Categorized | Alphabetical | R2 Layout | By Maturity | Security Category | By Standards Status | By Committee

Foundation

Conformance	Terminology	Security	Documents	Other
• CapabilityStatement N	• CodeSystem N	• Provenance 3	• Composition 2	• Basic 1
• StructureDefinition N	• ValueSet N	• AuditEvent 3	• DocumentManifest 2	• Binary N
• ImplementationGuide 1	• ConceptMap 3	• Consent 2	• DocumentReference 3	• Bundle N
• SearchParameter 3	• NamingSystem 1		• CatalogEntry 0	• Linkage 0
• MessageDefinition 1	• TerminologyCapabilities 0			• MessageHeader 4
• OperationDefinition N				• OperationOutcome N
• CompartmentDefinition 1				• Parameters N
• StructureMap 2				• Subscription 3
• GraphDefinition 1				
• ExampleScenario 0				

Base

Individuals	Entities #1	Entities #2	Workflow	Management
• Patient N	• Organization 3	• Substance 2	• Task 2	• Encounter 2
• Practitioner 3	• OrganizationAffiliation 0	• BiologicallyDerivedProduct 0	• Appointment 3	• EpisodeOfCare 2
• PractitionerRole 2	• HealthcareService 2	• Device 0	• AppointmentResponse 3	• Flag 1
• RelatedPerson 2	• Endpoint 2	• DeviceMetric 1	• Schedule 3	• List 1
• Person 2	• Location 3		• Slot 3	• Library 2
• Group 1			• VerificationResult 0	

Clinical

Summary	Diagnostics	Medications	Care Provision	Request & Response
• AllergyIntolerance 3	• Observation N	• MedicationRequest 3	• CarePlan 2	• Communication 2
• AdverseEvent 0	• Media 1	• MedicationAdministration 2	• CareTeam 2	• CommunicationRequest 2
• Condition (Problem) 3	• DiagnosticReport 3	• MedicationDispense 2	• Goal 2	• DeviceRequest 0
• Procedure 3	• Specimen 2	• MedicationStatement 3	• ServiceRequest 2	• DeviceUseStatement 0
• FamilyMemberHistory 2	• BodyStructure 1	• Medication 3	• NutritionOrder 2	• GuidanceResponse 2
• ClinicalImpression 0	• ImagingStudy 3	• MedicationKnowledge 0	• VisionPrescription 2	• SupplyRequest 1
• DetectedIssue 1	• QuestionnaireResponse 3	• Immunization 3	• RiskAssessment 1	• SupplyDelivery 1
	• MolecularSequence 1	• ImmunizationEvaluation 0	• RequestGroup 2	

http://hl7.org/implement/standards/fhir/resourcelist.html

Patient Resource Structure

8.1.2 Resource Content

Structure | UML | XML | JSON | Turtle | R3 Diff | All

Structure

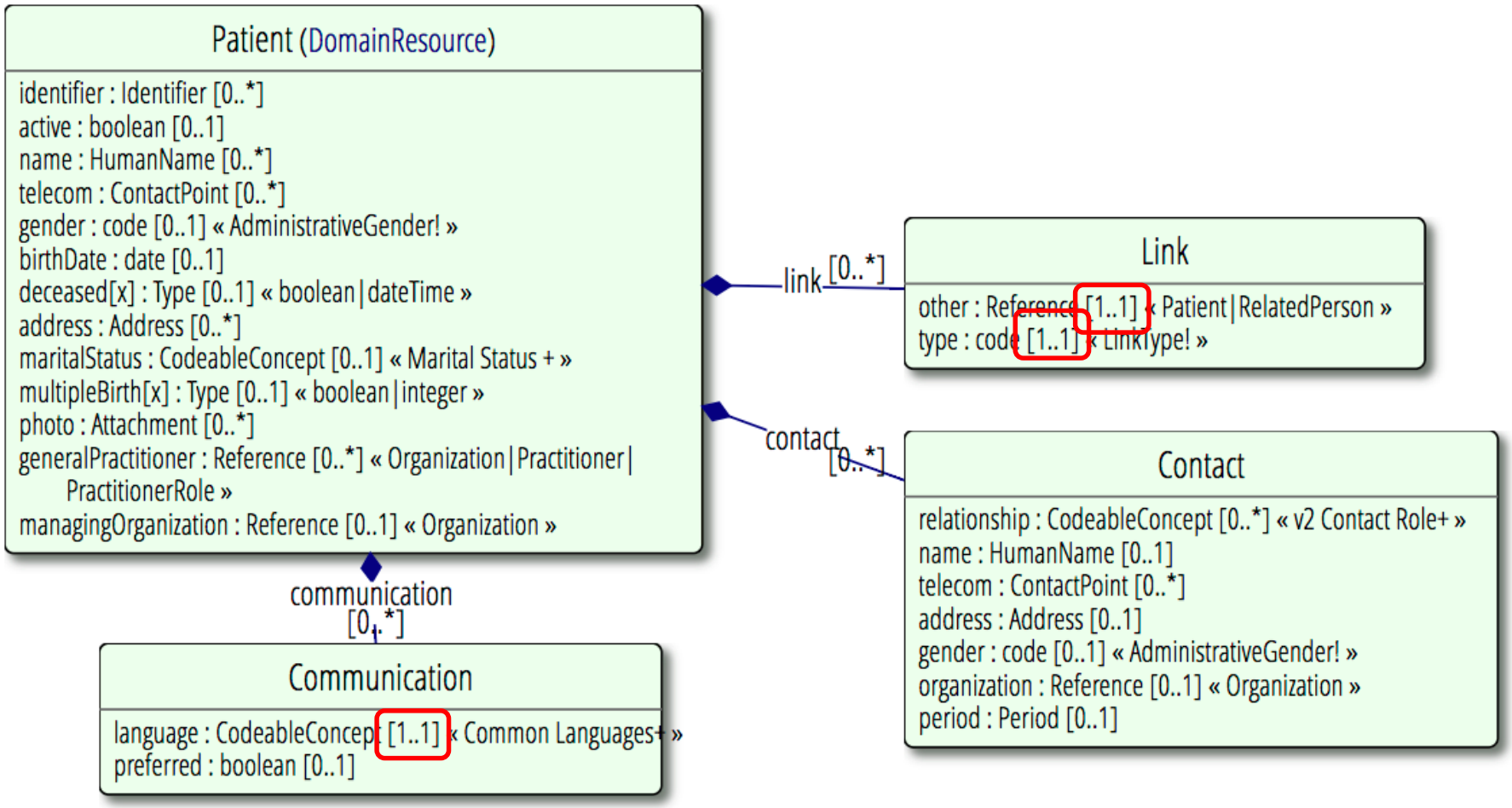
Name	Flags	Card.	Type	Description & Constraints
Patient	N		DomainResource	Information about an individual or animal receiving health care services Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
identifier	Σ	0..*	Identifier	An identifier for this patient
active	?! Σ	0..1	boolean	Whether this patient's record is in active use
name	Σ	0..*	HumanName	A name associated with the patient
telecom	Σ	0..*	ContactPoint	A contact detail for the individual
gender	Σ	0..1	code	male | female | other | unknown AdministrativeGender (Required)
birthDate	Σ	0..1	date	The date of birth for the individual
deceased[x]	?! Σ	0..1		Indicates if the individual is deceased or not
deceasedBoolean			boolean	
deceasedDateTime			dateTime	
address	Σ	0..*	Address	An address for the individual
maritalStatus		0..1	CodeableConcept	Marital (civil) status of a patient Marital Status Codes (Extensible)
multipleBirth[x]		0..1		Whether patient is part of a multiple birth
multipleBirthBoolean			boolean	
multipleBirthInteger			integer	
photo		0..*	Attachment	Image of the patient
contact	I	0..*	BackboneElement	A contact party (e.g. guardian, partner, friend) for the patient *+ SHALL at least contain a contact's details or a reference to an organization*
relationship		0..*	CodeableConcept	The kind of relationship v2 Contact Role (Extensible)
name		0..1	HumanName	A name associated with the contact person
telecom		0..*	ContactPoint	A contact detail for the person
address		0..1	Address	Address for the contact person
gender		0..1	code	male | female | other | unknown AdministrativeGender (Required)
organization	I	0..1	Reference(Organization)	Organization that is associated with the contact
period		0..1	Period	The period during which this contact person or organization is valid to be contacted relating to this patient
communication		0..*	BackboneElement	A language which may be used to communicate with the patient about his or her health
language		1..1	CodeableConcept	The language which can be used to communicate with the patient about his or her health Common Languages (Extensible but limited to All Languages)
preferred		0..1	boolean	Language preference indicator
generalPractitioner		0..*	Reference(Organization | Practitioner | PractitionerRole)	Patient's nominated primary care provider
managingOrganization	Σ	0..1	Reference(Organization)	Organization that is the custodian of the patient record
link	?! Σ	0..*	BackboneElement	Link to another patient resource that concerns the same actual person
other	Σ	1..1	Reference(Patient | RelatedPerson)	The other patient or related person resource that the link refers to
type	Σ	1..1	code	replaced-by | replaces | refer | seealso - type of link LinkType (Required)

Patient Resource Structure

8.1.2 Resource Content

Structure | UML | XML | JSON | Turtle | R3 Diff | All

UML Diagram (Legend)



Simple example: Patient.xml

```
<Patient xmlns="http://hl7.org/fhir">
    <name>
        <family value="Storm"/>
        <given value="John"/>
    </name>
    <identifier>
      <system value="http://mynamespace"/>
      <value value="123"/>
    </identifier>
    <gender value="male"/>
    <birthDate value="1974-12-25"/>
</Patient>
```

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

The Solution :
- Take advantage of EHR’s FHIR API

EHR Vendor FHIR API Capabilities

FHIR Resource	Allscripts	athenahealth	Cerner	Epic	Meditech
Patient	Read	Read, Write	Read, Write	Read, Write	Read
Provider	Read	Read	Read	Read	Read
Allergy	Read	Read	Read, Write	Read, Write	Read
Care Plan	Read	Read	Read	Read	Read
Condition	Read	Read	Read, Write	Read, Write	Read
Contract			Read		
Device	Read	Read	Read	Read	Read
Diagnostic Report	Read	Read	Read	Read	Read
Document	Read	Read	Read, Write	Read	Read
Encounter		Read	Read	Read	
Family history				Read	
Immunization	Read	Read	Read	Read	Read
Location				Read	
Medication	Read	Read	Read	Read	Read
Medication Order	Read	Read	Read	Read	Read
Observation	Read	Read	Read	Read, Write	Read
Person			Read		
Procedure	Read	Read	Read	Read	Read
ProcedureRequest			Read		
RelatedPerson			Read		
Schedule			Read, Write	Read, Write	

Massachusetts eHealth Collaborative

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Current State

Data transmission protocols between Transplant Centers (TCs) and CIBMTR has not kept pace with the changing technological landscape of healthcare informatics.

- **GOAL**: a production-ready **solution for electronic submission** of patient data to CIBMTR.
  - Includes patient demographics and Graft Versus Host Disease (GVHD) information.
- **Majority of TCs** use the **EPIC EHR** software product.
  - Leverage the EPIC supported "App Orchard" functionality to integrate with the EPIC system.
- **EPIC App Orchard** enables third party partners to create "add-on" applications that integrate with the EPIC EHR product.
  - Authorized third party apps can access authorized patient data in their EHR via FHIR specification.
- **CIBMTR Reporting App**, after installation an authorized TC user can leverage the App to **electronically submit patient data** to CIBMTR via the industry standard **FHIR** format.

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

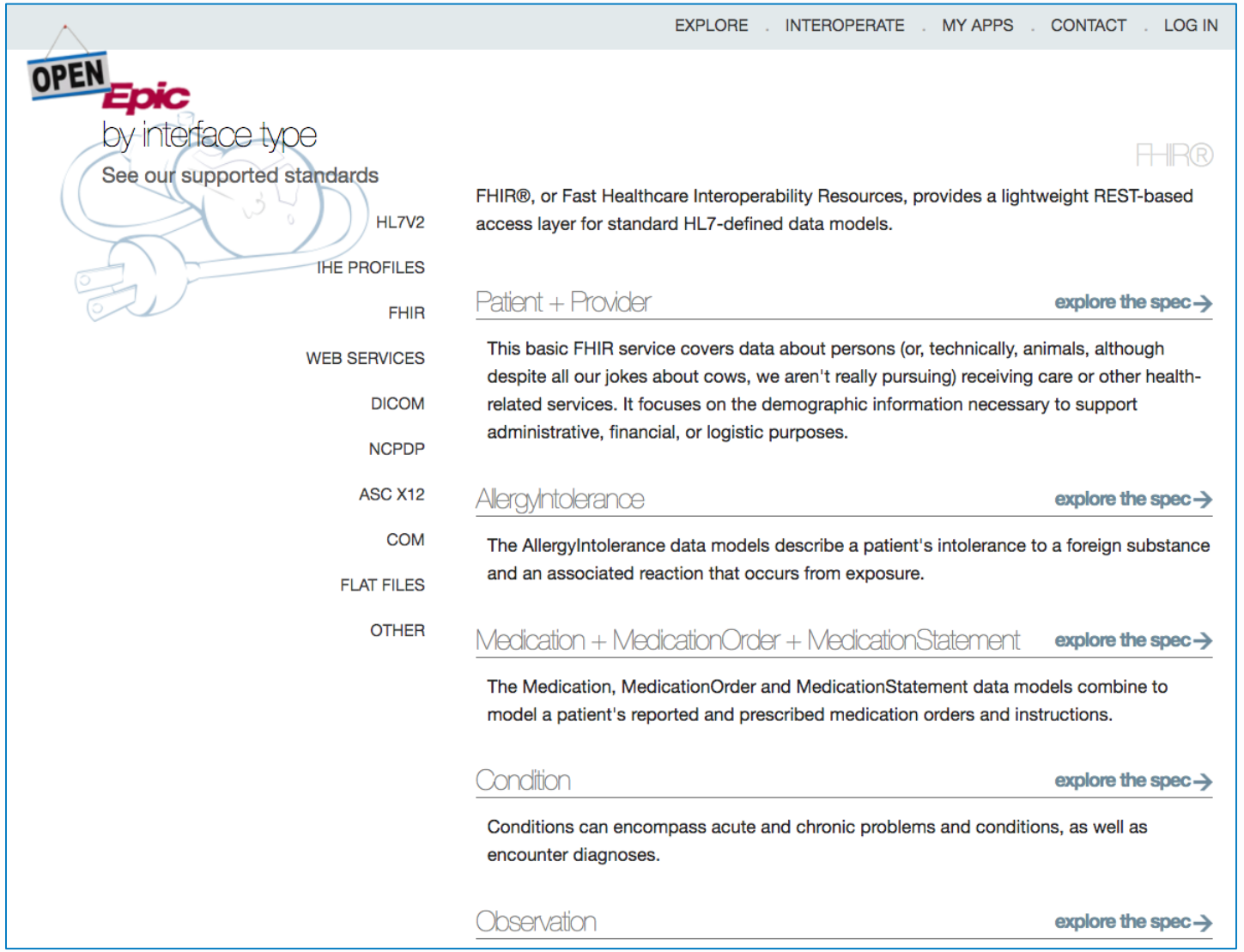
CIBMTR Reporting App

- A new messaging interface using healthcare informatics standards (HL7 FHIR) that embraces modern approaches to data exchange.
- Reduces data submission burden for centers by introducing greater interoperability between CIBMTR and transplant center EHR solutions & HLA Laboratory systems.
- 2019 - Expanding Proof of Concept Application to:
  - Exchange patient demographic and assign unique CRID
  - Exchange aGVHD (Acute Graft Versus Host Disease) data
  - Exchange recipient HLA typing

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

OpenEpic & FHIR

- Founding member of Argonaut Project
- Integral FHIR Server in all current installations

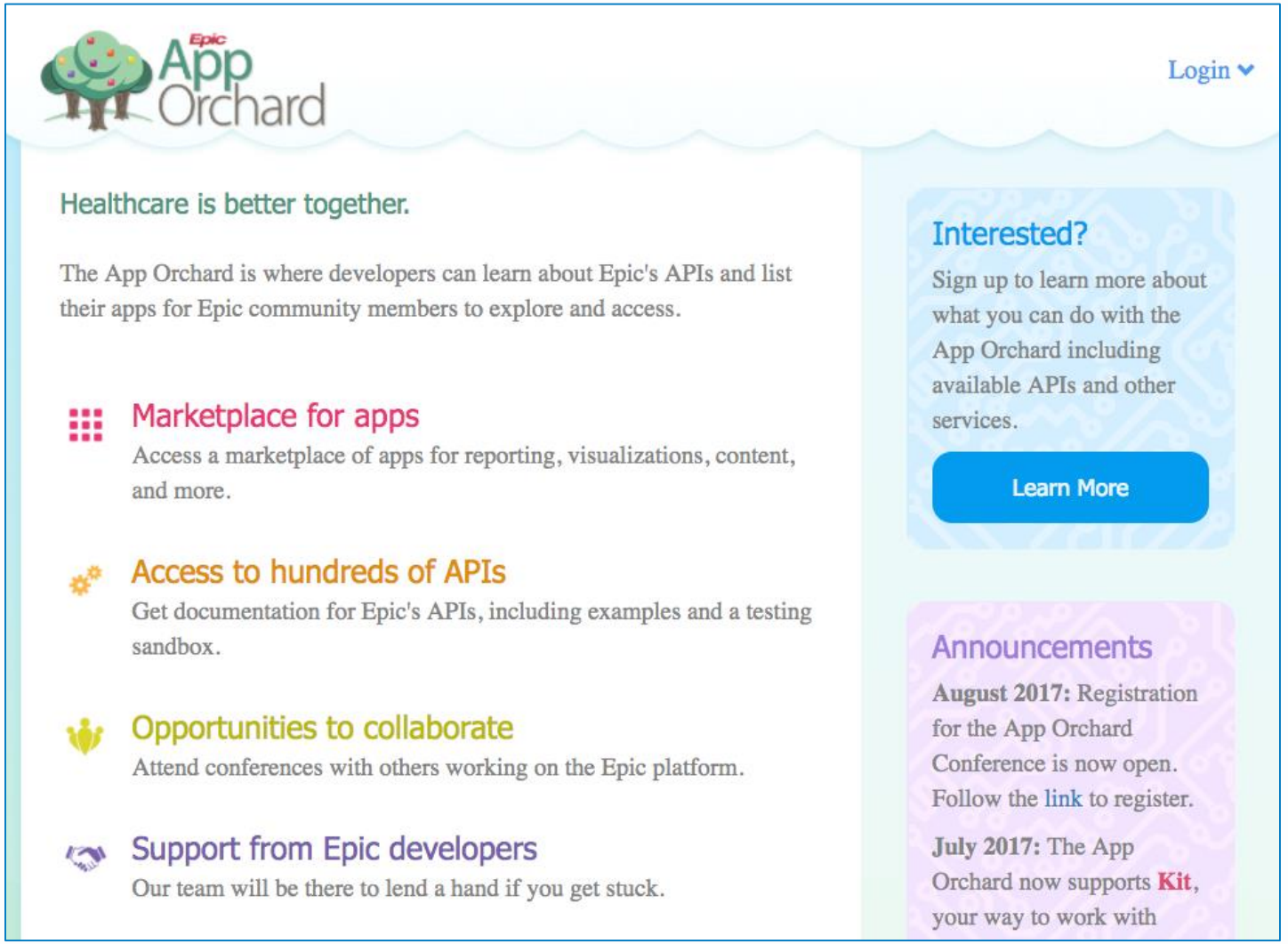


- https://open.epic.com/Interface/FHIR

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

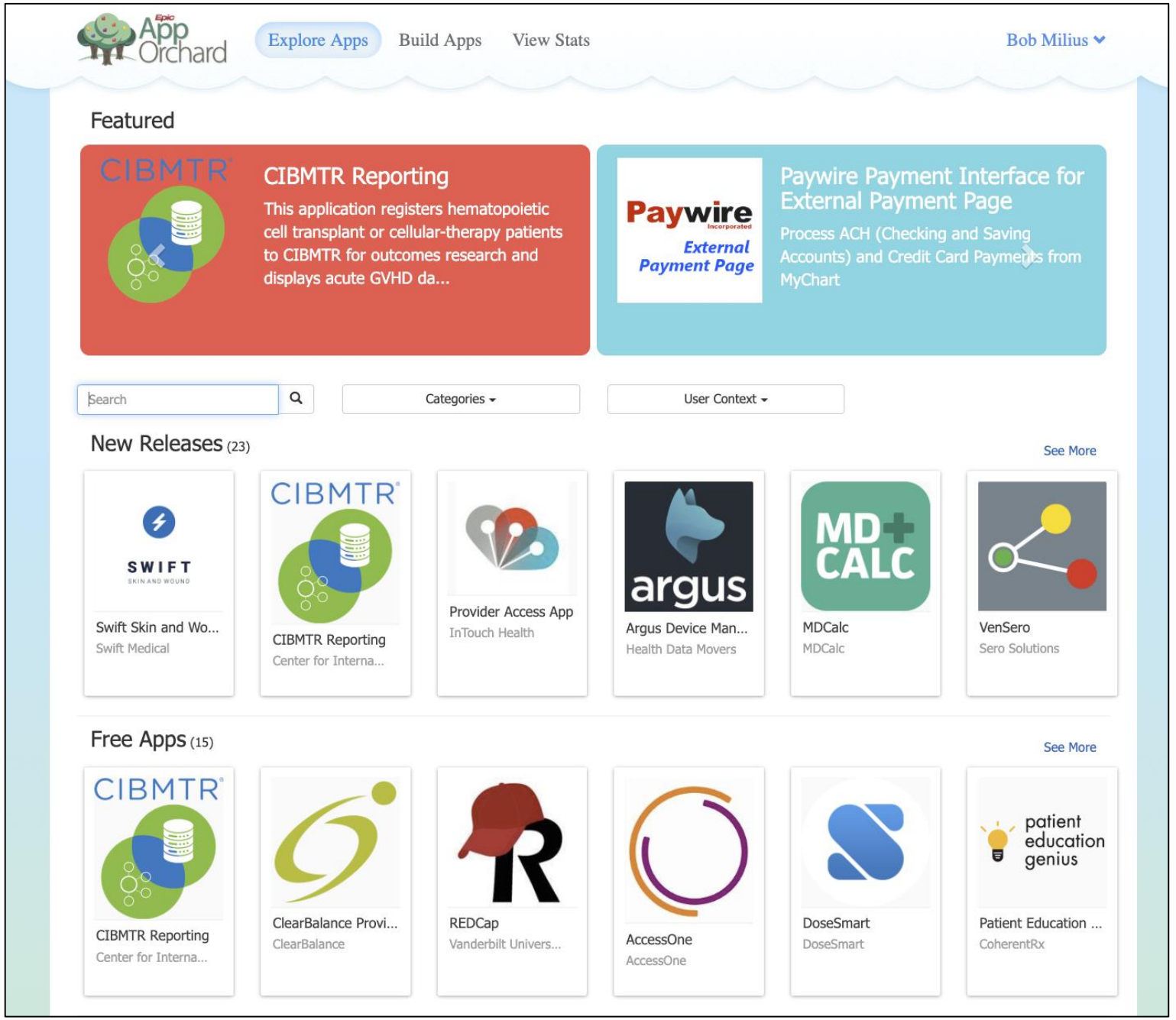
Epic App Orchard

- Identify mappings of CIBMTR patient data to FHIR resource
- Using these mappings, develop a free Epic App for transplant centers to collect Patient demographic data to report to CIBMTR
- Mappings are public, and may be applied to other EHRs



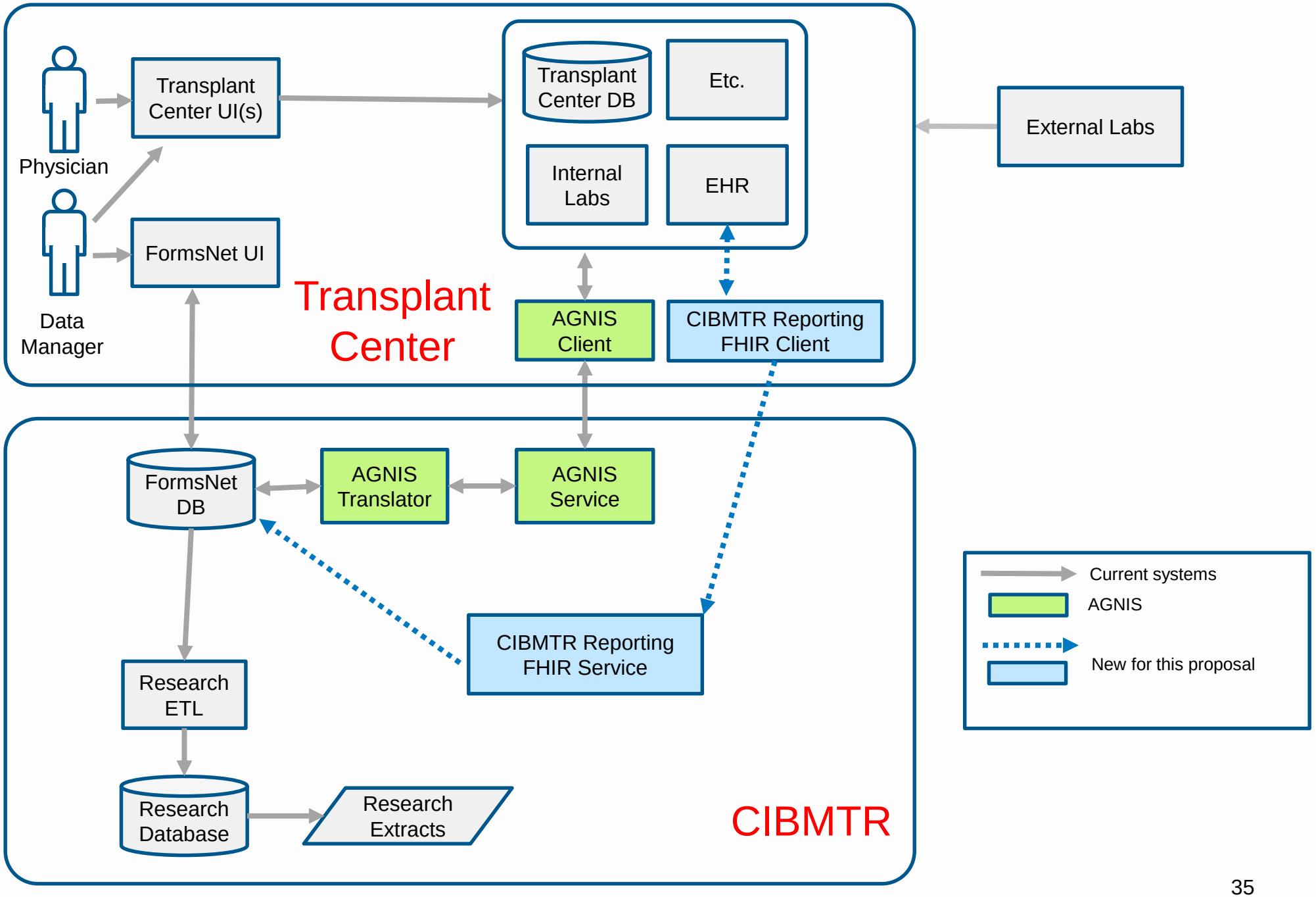
- https://apporchard.epic.com/

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

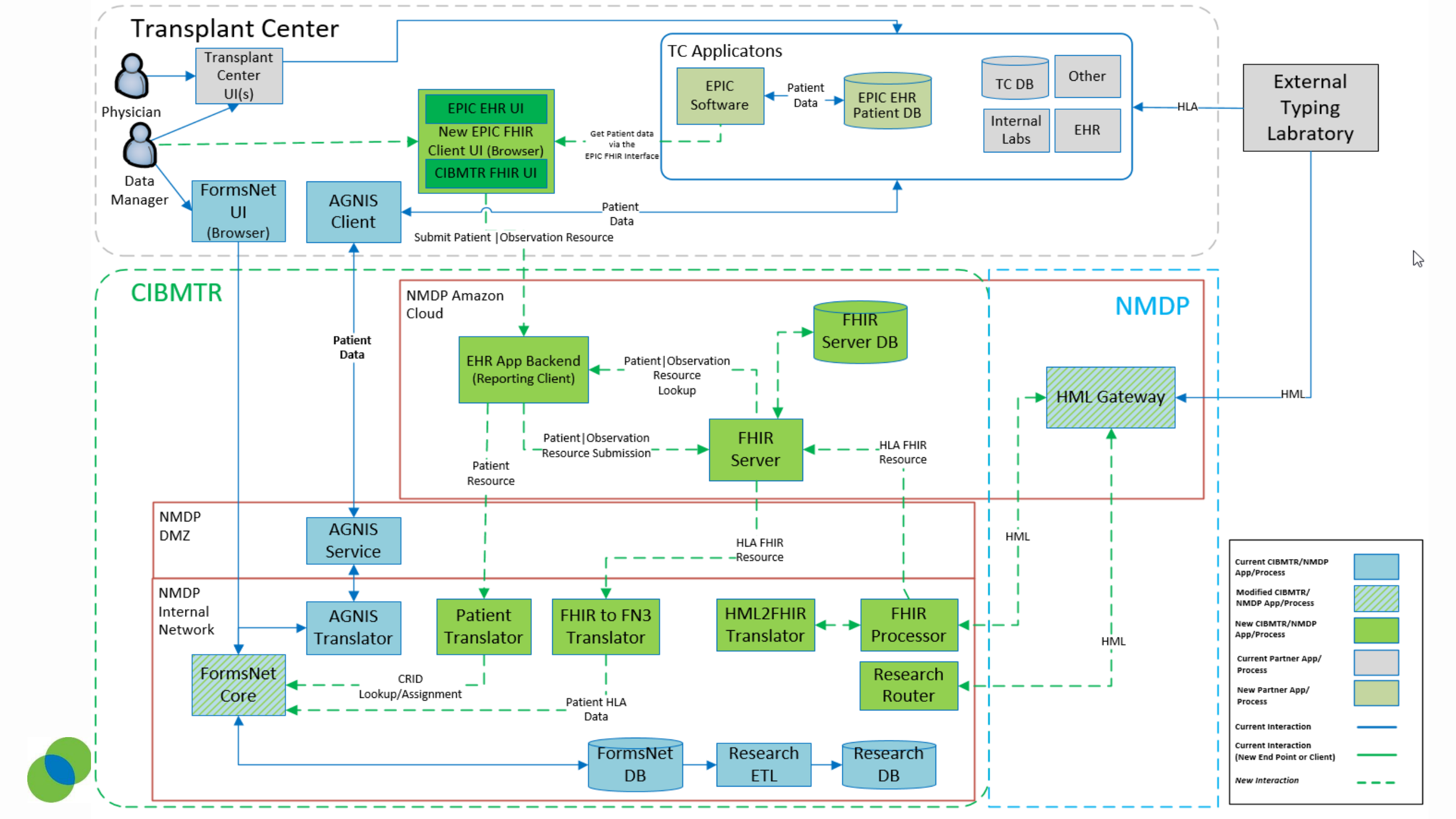


CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

High Level Overview



CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH


Transplant Center
Physician
Transplant Center UI(s)
Data Manager
FormsNet UI (Browser)
AGNIS Client
EPIC EHR UI
New EPIC FHIR Client UI (Browser)
CIBMTR FHIR UI
Get Patient data via the EPIC FHIR Interface
TC Applicatons
EPIC Software
Patient Data
EPIC EHR Patient DB
TC DB
Other
Internal Labs
EHR
HLA
External Typing Labratory
Patient Data
Submit Patient | Observation Resource
CIBMTR
NMDP Amazon Cloud
NMDP
FHIR Server DB
EHR App Backend (Reporting Client)
Patient | Observation Resource Lookup
HML Gateway
HML
Patient Data
Patient | Observation Resource Submission
FHIR Server
HLA FHIR Resource
Patient Resource
NMDP DMZ
AGNIS Service
HLA FHIR Resource
HML
NMDP Internal Network
AGNIS Translator
Patient Translator
FHIR to FN3 Translator
HML2FHIR Translator
FHIR Processor
HML
FormsNet Core
CRID Lookup/Assignment
Research Router
Patient HLA Data
FormsNet DB
Research ETL
Research DB
Current CIBMTR/NMDP App/Process
Modified CIBMTR/ NMDP App/Process
New CIBMTR/NMDP App/Process
Current Partner App/ Process
New Partner App/ Process
Current Interaction
Current Interaction (New End Point or Client)
New Interaction

Key Components

Component	Description
CIBMTR Reporting App (Browser-based)	EPIC compliant App to access the EHR patient data via the FHIR interface. Submits Patient Data to the CIBMTR hosted EHR App Backend server.
CIBMTR EHR App Backend server	EHR App Backend server accepts submission requests from the Browser-based Epic FHIR Client, validates user credentials and performs fine-grained authorization.
FHIR Server	Industry standard FHIR server for staging of patient demographic and GVHD data. Supports the transfer of FHIR resources from Epic's FHIR interface to the CIBMTR's FHIR API.
Patient Translator	Service to accept Patient information and make calls to FN3 Core application to determine if patient and exists or if they need to be registered as a new patient.
FHIR to FN3 Translator	Component that monitors the FHIR Server newly submitted FHIR Resource. converts FHIR resources to FN3 Objects and communicates to the FN3 Core Aplication.

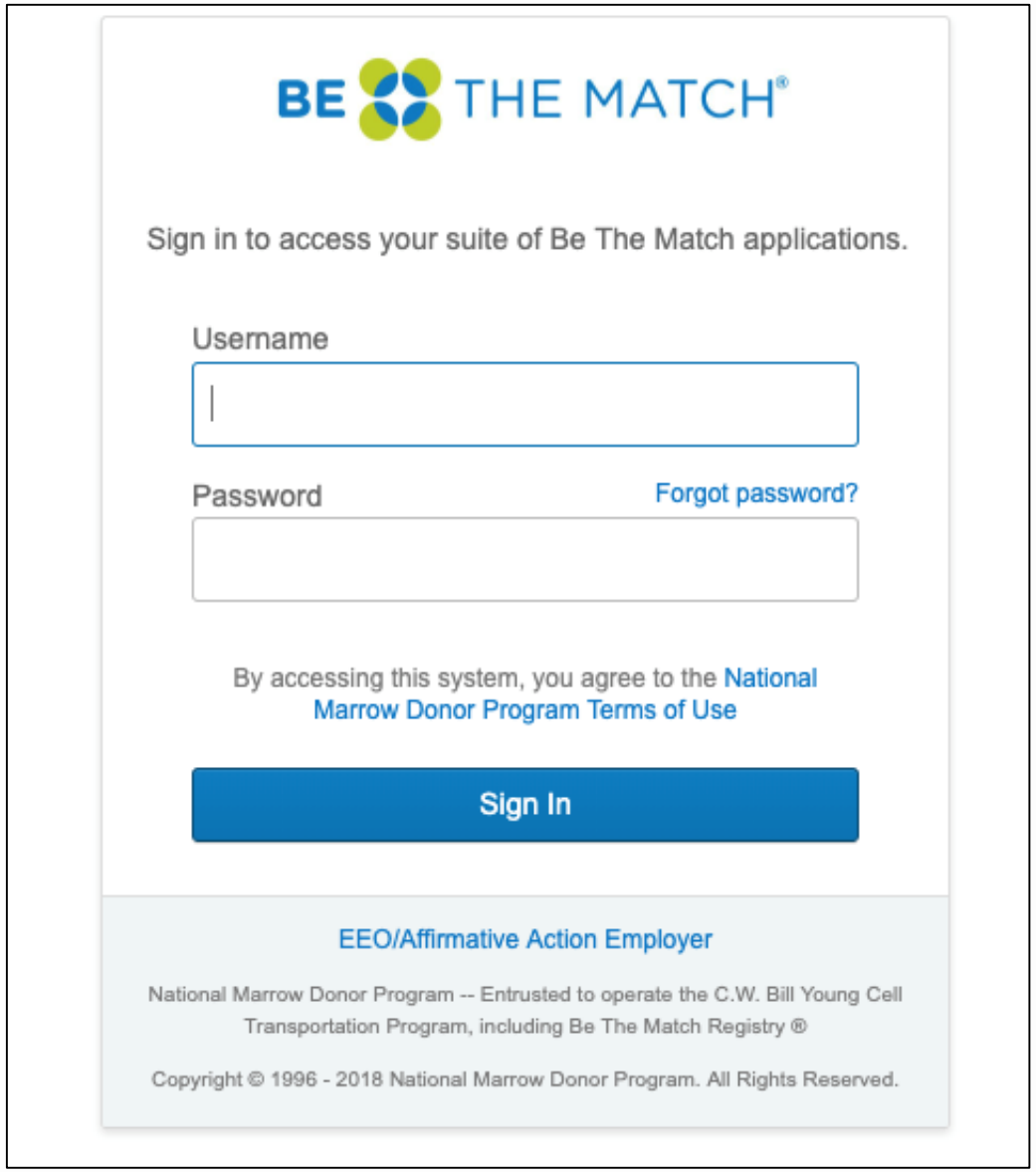
Technology

Technology	Description	Justification
Java	NMDP supported open source language. Java was selected because we believed we would be better be able to implement security features.	Used for the prototypes, so continue to leverage for the production solution.
Angular	NMDP preferred open source language for java-scripting is Angular 7 Javascript platform.	Angular 7 is the latest version of the Angular platform.
Spring Boot	NMDP preferred Microservice Standard	
MySQL	Amazon RDS MySQL, which is the Amazon database service leveraged by other existing applications.	Licensing costs are prohibitive for leveraging Oracle in AWS
Docker	Delivers a repeatable technology stack regardless of server platform.	Application Idempotence.

Security Considerations

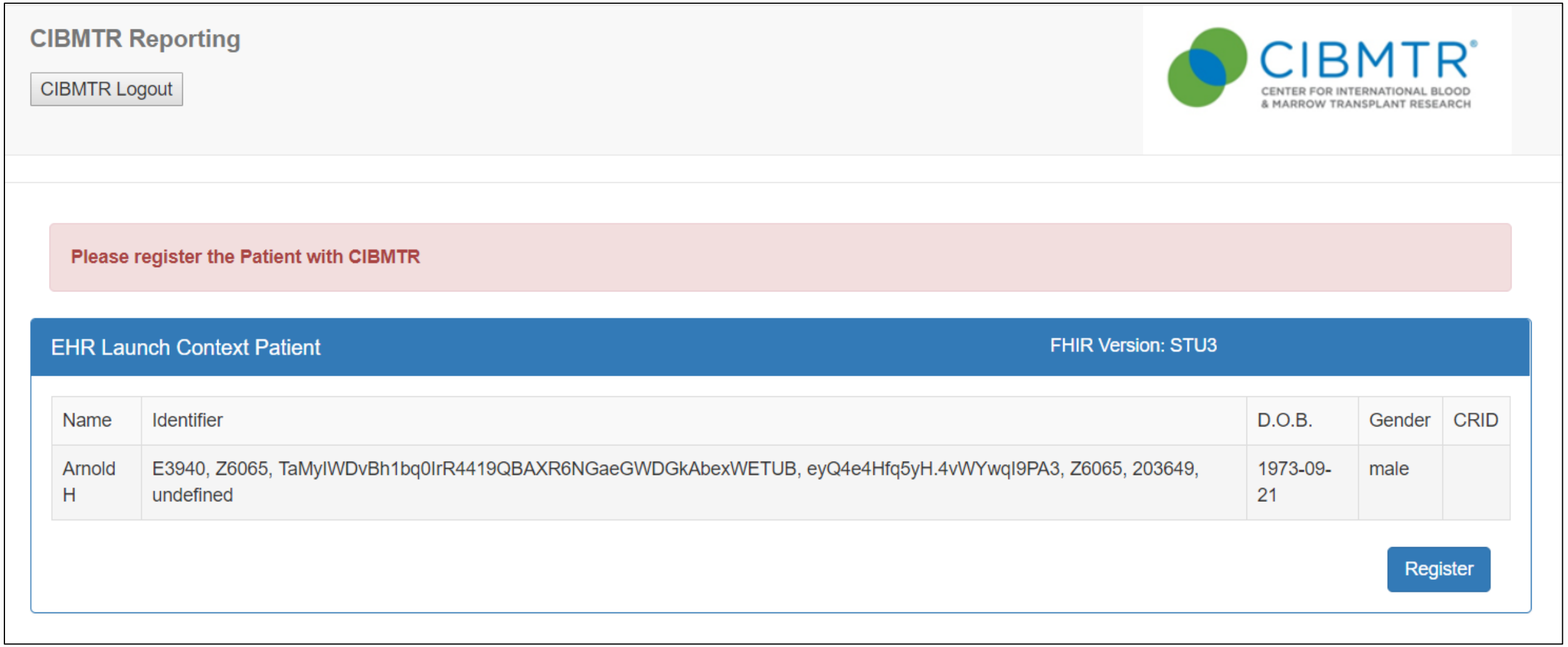
- Reporting App obtains credentials when logging into CIBMTR identity provider.
- FHIR security labels assigned to all resources based on user credentials
- General Data Access Policy
  - Limited based on CIBMTR user credential; only see data for center that user has been granted access.
- Redaction of Patient Identifiable Information (PII) that is not needed to support application functionality.

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH



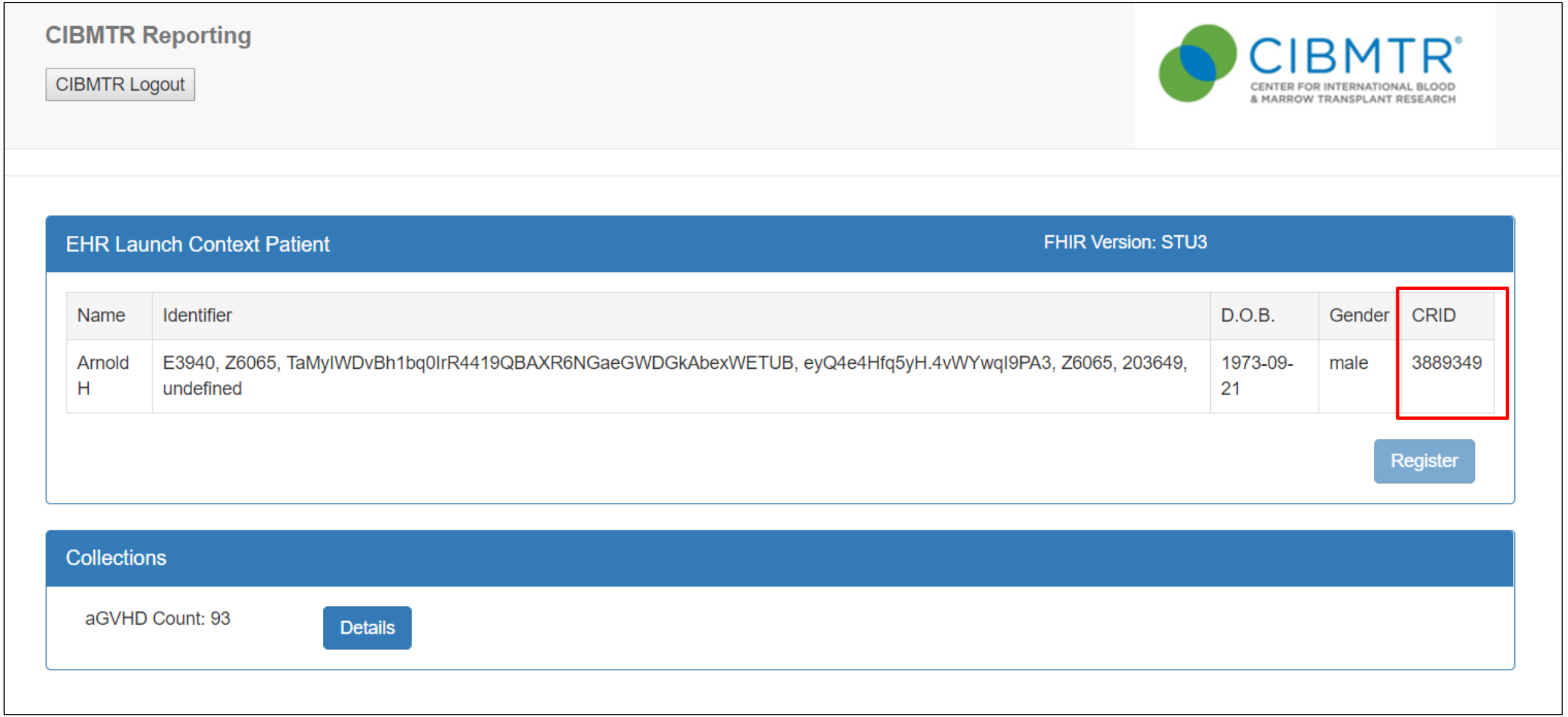
User login to CIBMTR/NMDP.
The user is required to have a FormsNet username and password.

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH



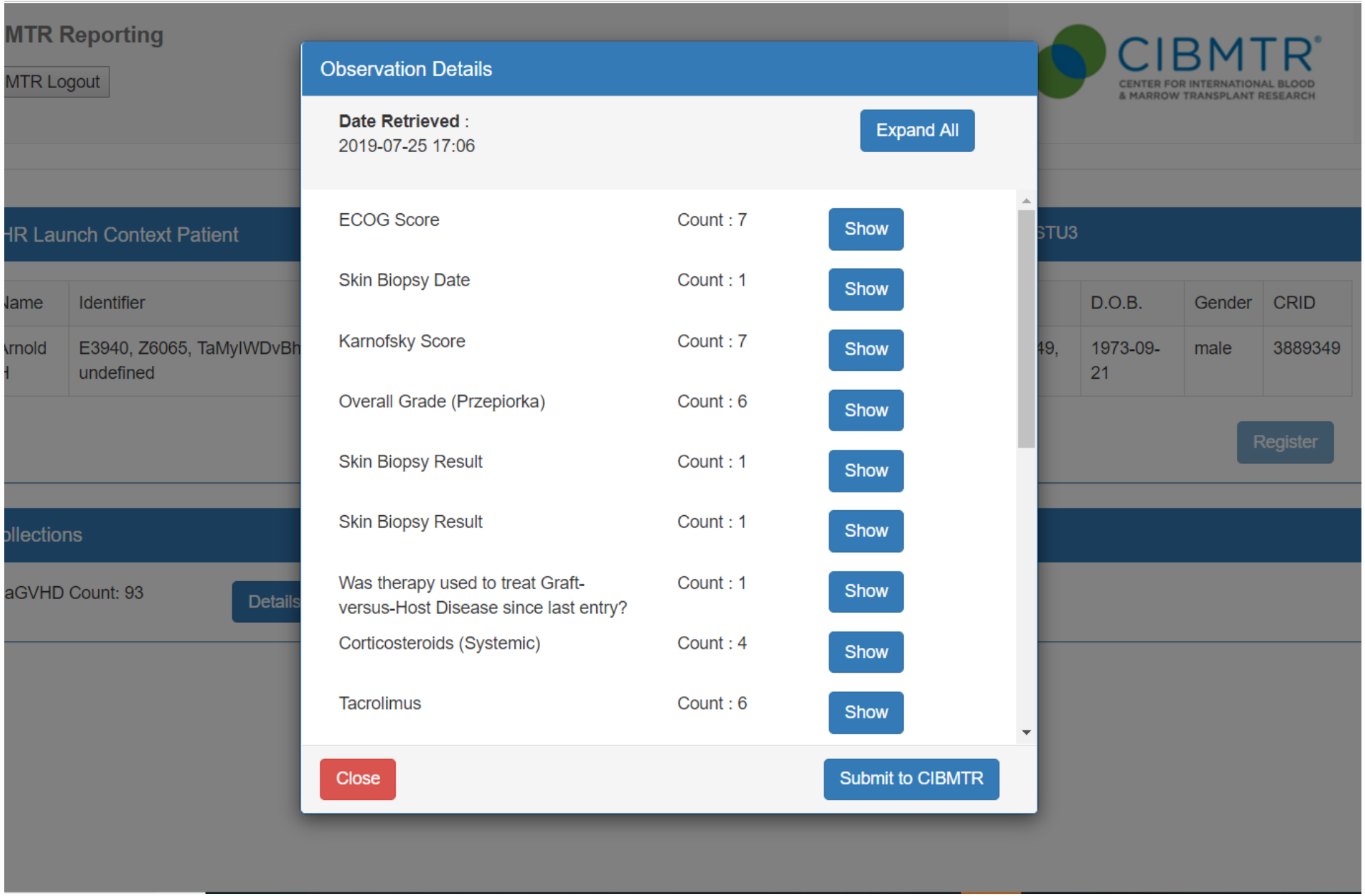
Information is displayed about current patient selected in the Epic system. The CRID is displayed if the patient is already registered with CIBMTR. If not, the patient may be registered by clicking on **Register.**

CIBMTR
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH



The patient has been registered and the assigned CRID is shown.

CIBMTR
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH



After clicking on the **Details** button**,** a summary of acute GVHD data is grouped by observation code.
Individual observations may be displayed by clicking on **Show**. All observations may displayed by clicking on **Expand All**.

Where We Are Headed

- Increase transplant center adoption of reporting App.
- Improve user interface and user experience in the App.
- Add to the number of supported FHIR Resources.
- Developing App’s for other EHRs.
- Investigate more ways of ingesting real world data.

Summary

- Who we are and what we do.
- Outlined the current data collection challenges.
- Introduced HL7 FHIR Resources.
- Creation the CIBMTR Reporting App for Epic using FHIR.
- Where we are headed next.

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Questions

CIBMTR®
CENTER FOR INTERNATIONAL BLOOD & MARROW TRANSPLANT RESEARCH

Appendix

The CIBMTR® (Center for International Blood and Marrow Transplant Research®) is a research collaboration between the National Marrow Donor Program® (NMDP)/Be The Match® and the Medical College of Wisconsin (MCW).