KenSci

Real time COVID Command Center

Surge Planning, Bed management, Ventilator capacity for COVID-19 response.

Built with FHIR and Azure with EMR, ADT, HL7 and Workforce mgmt. data.

Healthcare AI middleware. Built on Azure. For clinicians & data scientists. Validated by research.

CMS AI Challenge Finalist	KLAS 93.1 Score	Gartner Cool Vendor	2019, 2018 Finalist Microsoft Partner of the Year	2019, 2018 Winner HIMSS Health Innovation Awards	KDD IEEE FAT*2020 AAAI / ACM conference on ARTIFICIAL INTELLIGENCE, ETHICS, AND SOCIETY	47 Published Papers

Solution Overview

1. A Mobile Command Center for COVID-19 response.
2. Current capabilities include
    1. Interactive Surge Capacity Planning
    2. Community risk identifier (cohorts and patients)
    3. Real time Bed and Ventilator Capacity Tracking
    4. Huddle tool for triaging, discharge planning.
3. Releasing soon
    1. Emergency Department census surge
4. Live in 48 hours, data resides with customer.
5. Pulls in data from EMR, HL7, workforce mgmt., ADT in a standard FHIR format. In Real time.
6. Can be transacted via MSFT EA on Azure Marketplace.

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Surge Capacity Planning and Community Risk Management

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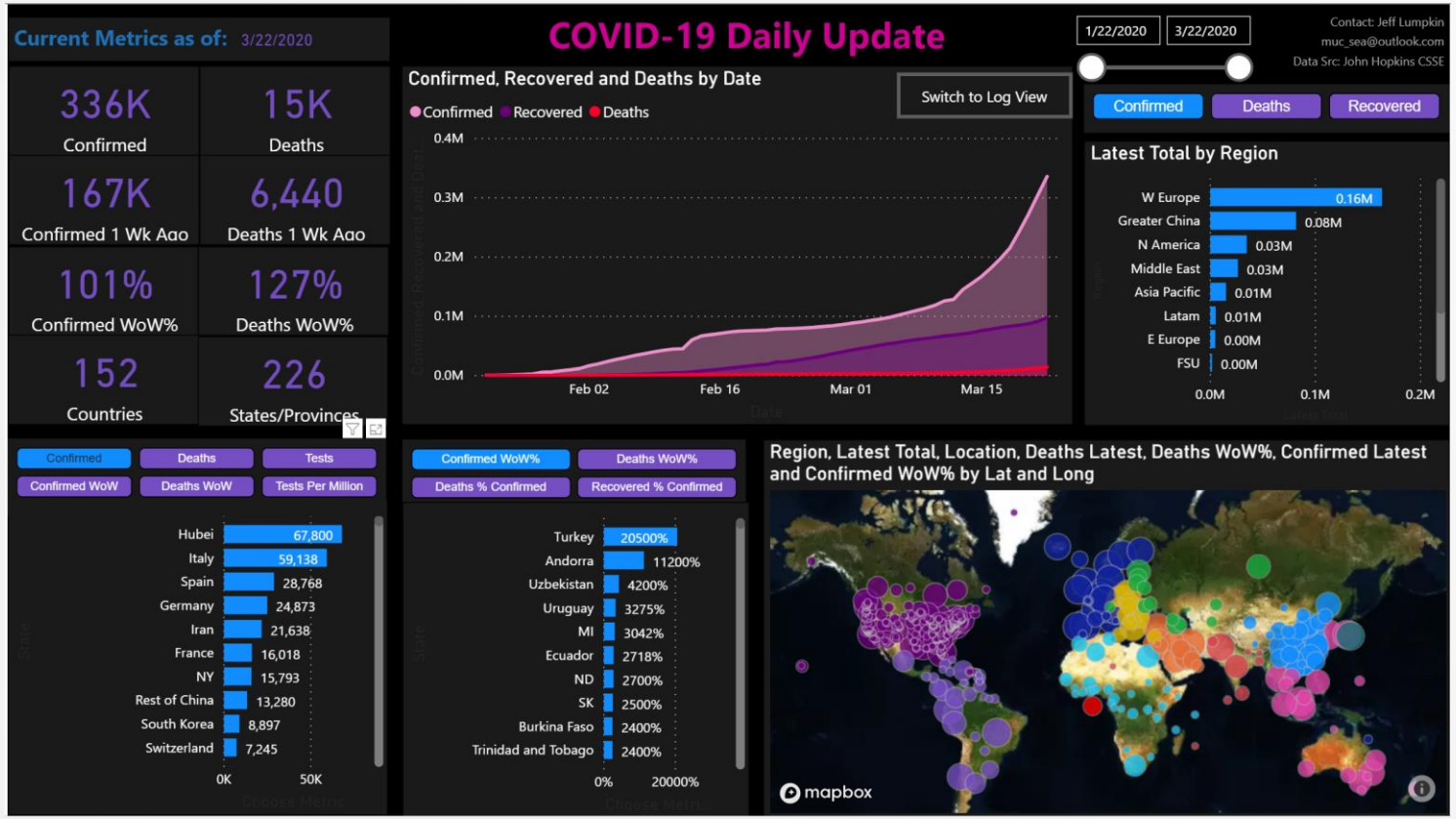
Worldwide, and local, Daily COVID-19 Case Tracker [Link]

- Daily updates based on John Hopkins data
- Hosted publicly on PowerBI

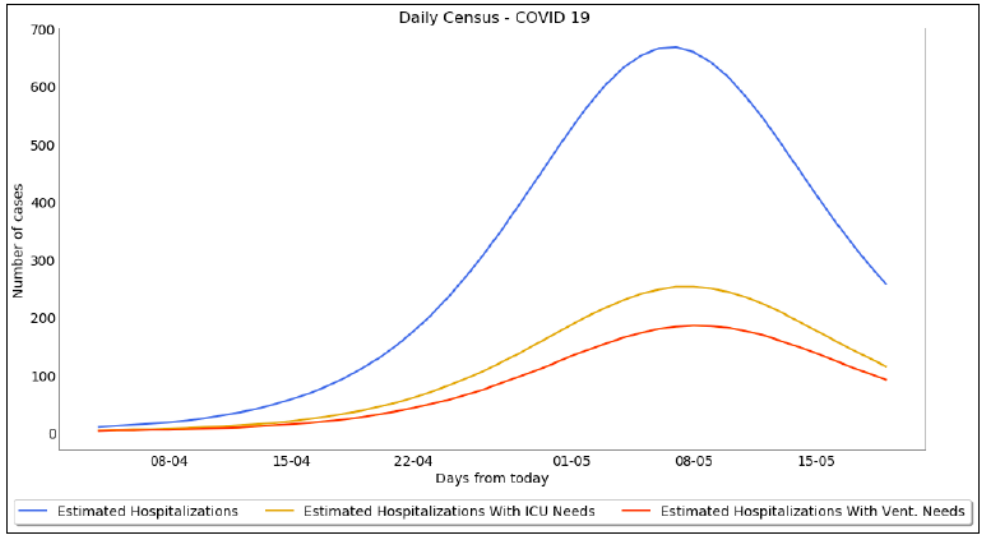


Surge Planning for County / District and Care facilities

County: Lehigh

	Base	+ 30%
Peak Census Day	May 4, 2020	May 5, 2020
Peak Census	667	867
Peak ICU Census	252	329
Peak Ventilation	185	240
Peak Arrivals	98	128

Base Case

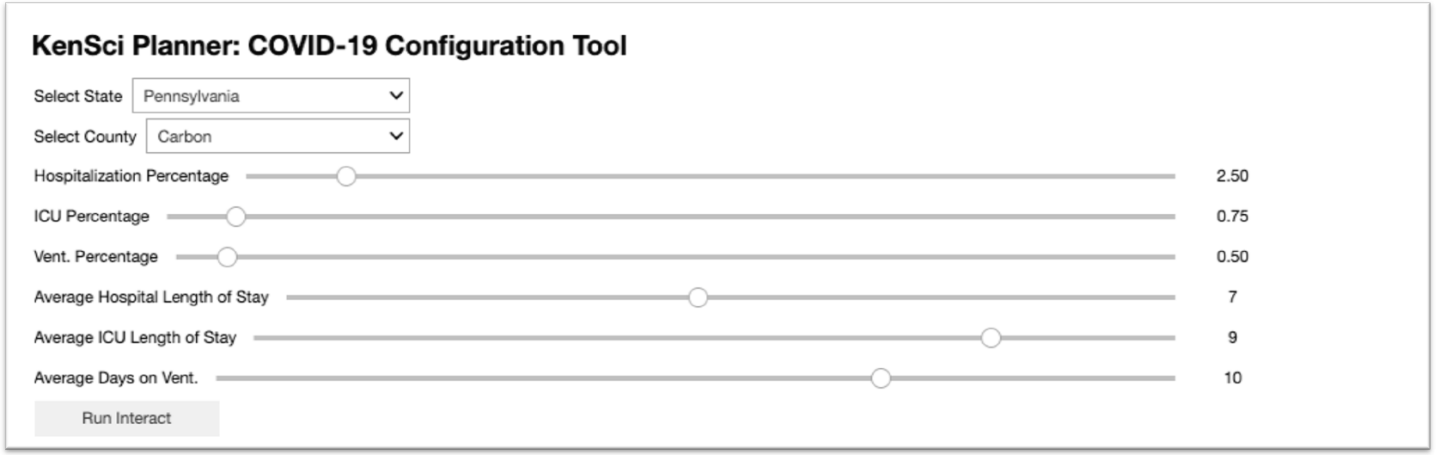


Overall Market Share Estimated: 25%

Hospital	Relative Share	Peak Census (Base)	Peak ICU Census (Base)	Peak Ventilation (Base)	Peak Arrivals (Base)
St. Luke's Hospital - Allentown Campus	49%	327	123	91	48
St. Luke's Hospital - Sacred Heart Campus	21%	140	53	39	21
St. Luke's University Hospital - Bethlehem Campus	21%	140	53	39	21
St. Luke's Hospital - Quakertown Campus	3%	20	8	6	3
St. Luke's Hospital - Anderson Campus	3%	20	8	6	3

Scenario planning for key resources based on growth rate

1



1. **Scenario planning with capacity constraints**
2. **Peak Utilization impact on care facilities**
3. **Median Scenario based on % hospitalization**

2

	Peak Census	Peak ICU Census	Peak Ventilation	Peak Arrivals
St. Luke's Hospital - Allentown Campus	521	196	145	76
St. Luke's University Hospital - Bethlehem Campus	436	166	121	65
St. Luke's Hospital - Sacred Heart Campus	300	113	84	44
St. Luke's Hospital - Anderson Campus	241	91	67	36
St. Luke's Hospital - Warren Campus	176	67	49	25
St. Luke's Hospital - Miners Campus	175	66	48	26
St. Luke's Hospital - Monroe Campus	149	56	42	22
St. Luke's Hospital - Gnaden Huetten Campus	72	28	20	10
Geisinger St. Luke's Orwigsburg Campus	56	21	16	8
St. Luke's Hospital - Quakertown Campus	20	8	6	3
Total	2146	812	598	315

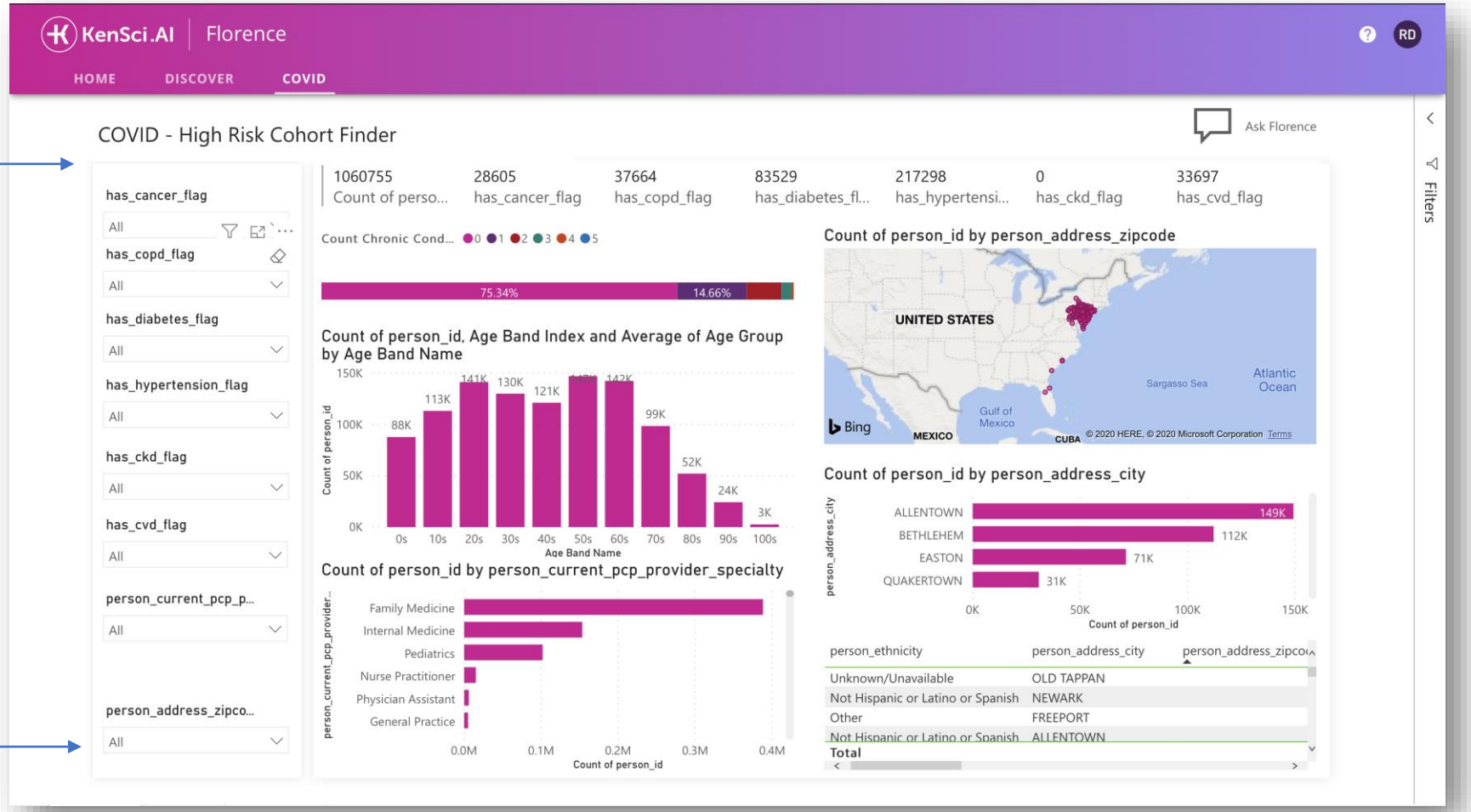
3

	Base Case	+30% Hospitalizations
Hospitalization % (overall)	2.50%	3.25%
ICU % (overall)	0.75%	0.98%
Vent % (overall)	0.50%	0.65%
Average LOS	7.0 days	Same
Average ICU LOS	9.0 days	Same
Average Vent Days	10.0 days	Same

Community Risk Management

Population and Cohort Analyzer to identify members in the community that are at greatest risk for community acquired COVID-19, based on early literature (multiple comorbidities, age, etc.)

Identify patients in the system based on chronic condition flags



Risk Stratification and Outreach

Population and Cohort Analyzer to identify members in the community that are at greatest risk for community acquired COVID-19, based on prior history, comorbidity and SDOH

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Real Time Bed, Ventilator and Patient Tracking

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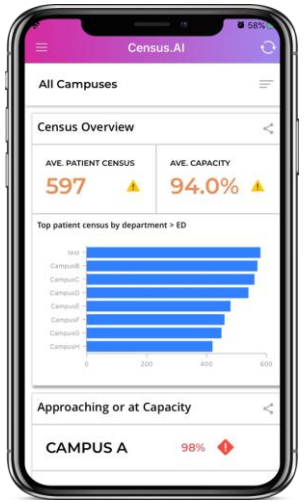
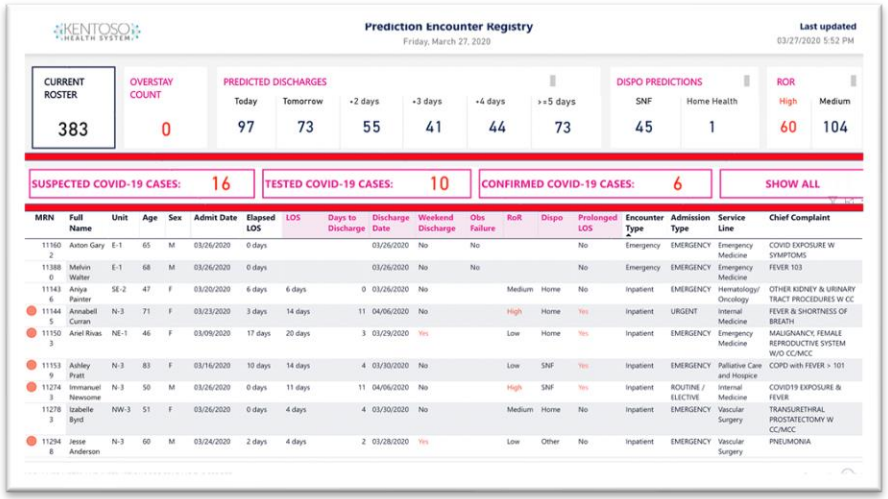
COVID Command Center for Hospitals, By KenSci



Real Time Bed Management

Hospital capacity management through HL7 ADT and/or FHIR NRT alerting of hospital Census



Huddle Tool for Case Management and Discharge Planning

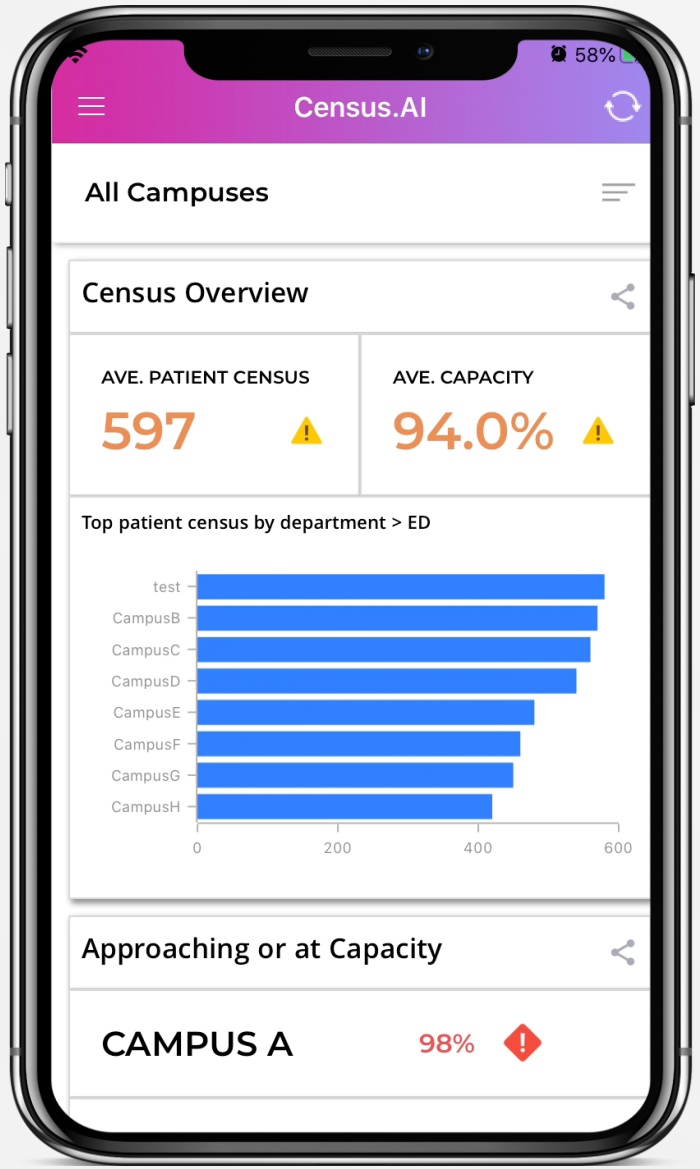
Real time views, based on EMR, labs, etc. of COVID cases to manage bed availability, personnel and discharge plans across multi hospital systems

Real Time Ventilator Tracking

Planning and Tracing Ventilators in use through real time HI7 ORM and OSU feeds, as well as EMR Flow sheets

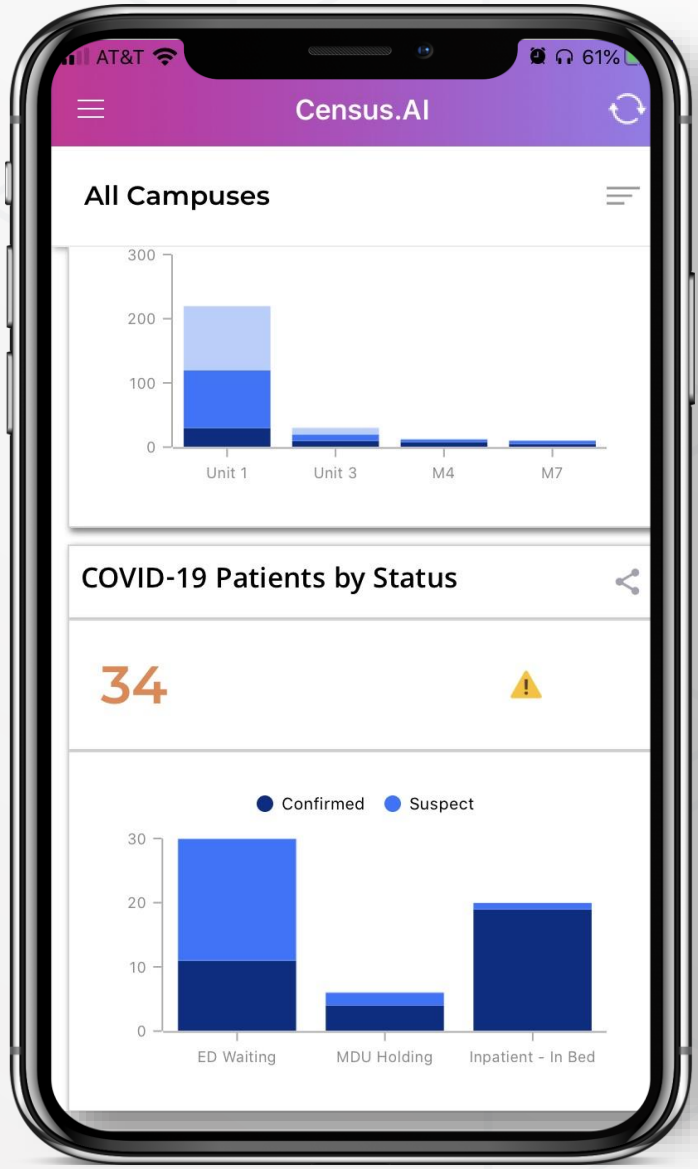
+ SMART on FHIR Census App

Real-time Mobile Command Center



Understand real-time capacity and discharge level metrics to quickly and effectively route patients to the right place.

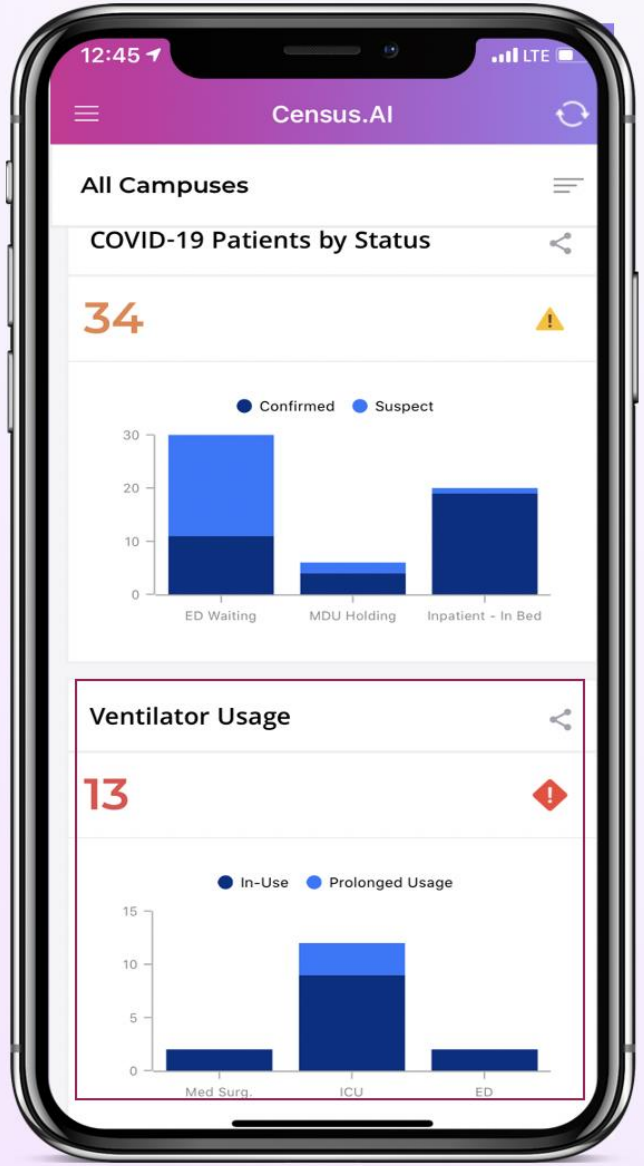
- Rapidly make patient routing decisions based on real time data of system wide patient census, cohort and occupancy levels.
- HL7 ADT feeds blended in real-time providing you with the information you need at your fingertips.
- Multiple views and filters in an intuitive user interface with overall system views and the ability to drill into campus/unit views



REAL-TIME ANALYTICS

+ SMART on FHIR Census App

Real-Time Mobile Command-Center



Tracking patients intubated and Ventilators in use

Real-Time Analytics during a time of crisis

Ventilator shortages across health systems are providing unique challenges to hospital administrators.

The mobile app shows real time usage of ventilators using existing HL7 feeds.

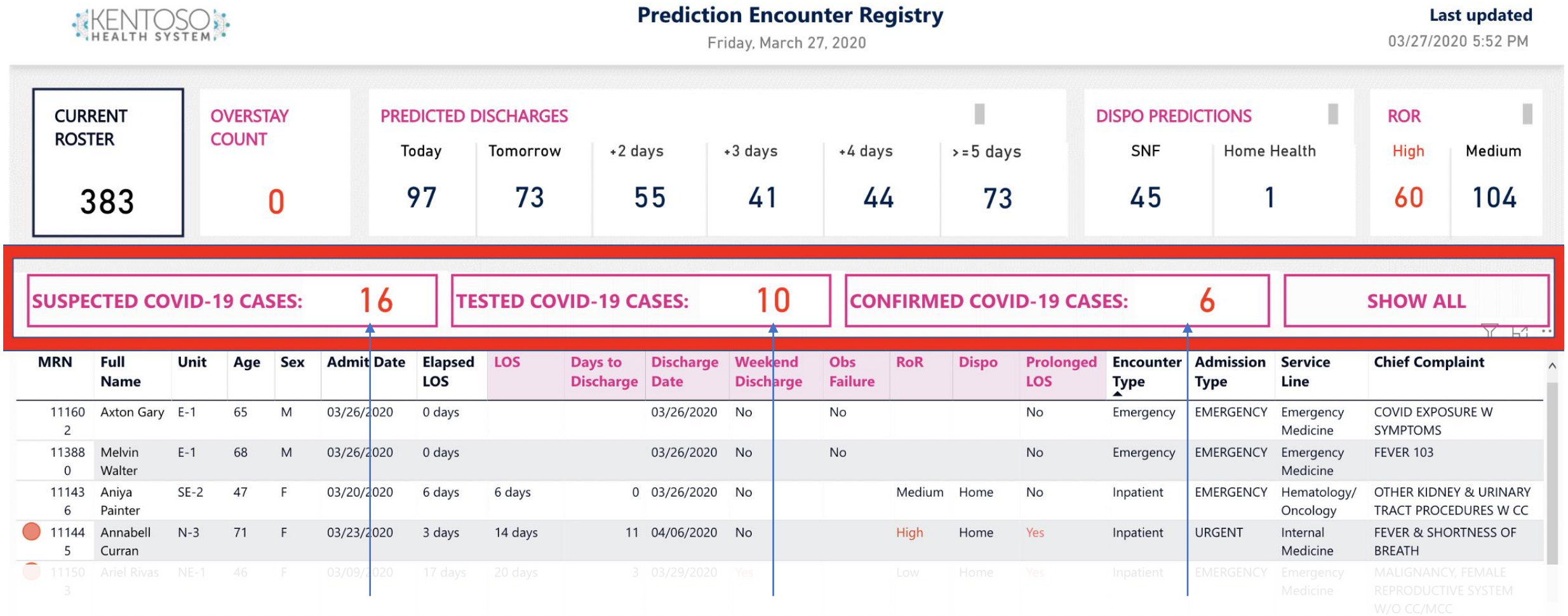
1. For EMR's where vent's are a schedulable resource, the engine consumes SIU feeds
2. For EMR's where vent's are an 'order', the engine uses HL7 ORM and ORU
3. For EMR's (like Epic Systems) where vents are tracked via a flowsheet, the engine extracts a custom feed

The resulting stream converts to the FHIR CDM and exposed to the app.

*prolonged usage > 20 days

In patient COVID Tracker and Discharge planning

Used daily by case management workflow for discharge planning and bed management



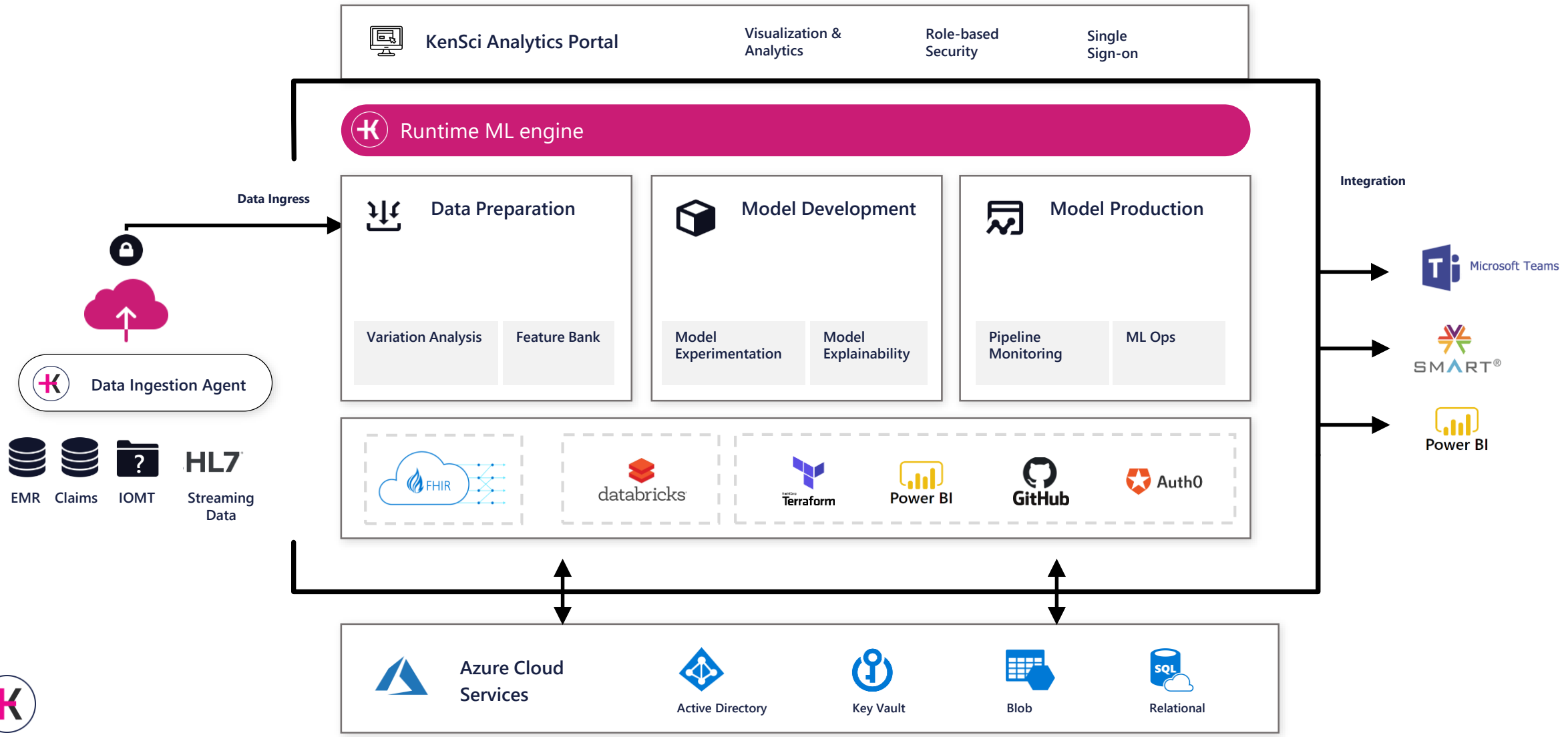
MRN	Full Name	Unit	Age	Sex	Admit Date	Elapsed LOS	LOS	Days to Discharge	Discharge Date	Weekend Discharge	Obs Failure	RoR	Dispo	Prolonged LOS	Encounter Type	Admission Type	Service Line	Chief Complaint
111602	Axton Gary	E-1	65	M	03/26/2020	0 days			03/26/2020	No	No			No	Emergency	EMERGENCY	Emergency Medicine	COVID EXPOSURE W SYMPTOMS
113880	Melvin Walter	E-1	68	M	03/26/2020	0 days			03/26/2020	No	No			No	Emergency	EMERGENCY	Emergency Medicine	FEVER 103
111436	Aniya Painter	SE-2	47	F	03/20/2020	6 days	6 days	0	03/26/2020	No		Medium	Home	No	Inpatient	EMERGENCY	Hematology/ Oncology	OTHER KIDNEY & URINARY TRACT PROCEDURES W CC
111445	Annabell Curran	N-3	71	F	03/23/2020	3 days	14 days	11	04/06/2020	No		High	Home	Yes	Inpatient	URGENT	Internal Medicine	FEVER & SHORTNESS OF BREATH
111503	Ariel Rivas	NE-1	46	F	03/09/2020	17 days	20 days	3	03/29/2020	Yes		Low	Home	Yes	Inpatient	EMERGENCY	Emergency Medicine	MALIGNANCY, FEMALE REPRODUCTIVE SYSTEM W/O CC/MCC
112748	Byrd	NW-3	64	F	03/26/2020	0 days	4 days	4	03/30/2020	No		Medium	Home	No	Inpatient	EMERGENCY	Vascular Surgery	TRANSURETHRAL PROSTATECTOMY W CC/MCC
112948	Jesse Anderson	N-3	60	M	03/24/2020	2 days	4 days	2	03/28/2020	Yes		Low	Other	No	Inpatient	EMERGENCY	Vascular Surgery	PNEUMONIA

Number of patients that are suspect to have COVID-19 based on simple NLP from Chief Complaint.
Can further move this out to include the following: Lab values , Vitals, Etc.

Number of patients where the SARS-COV-2 test was performed.
EMR ID neumonic

Number of patients where the SARS-COV-2 test was performed and result POSITIVE or ICD-10 in U07.1

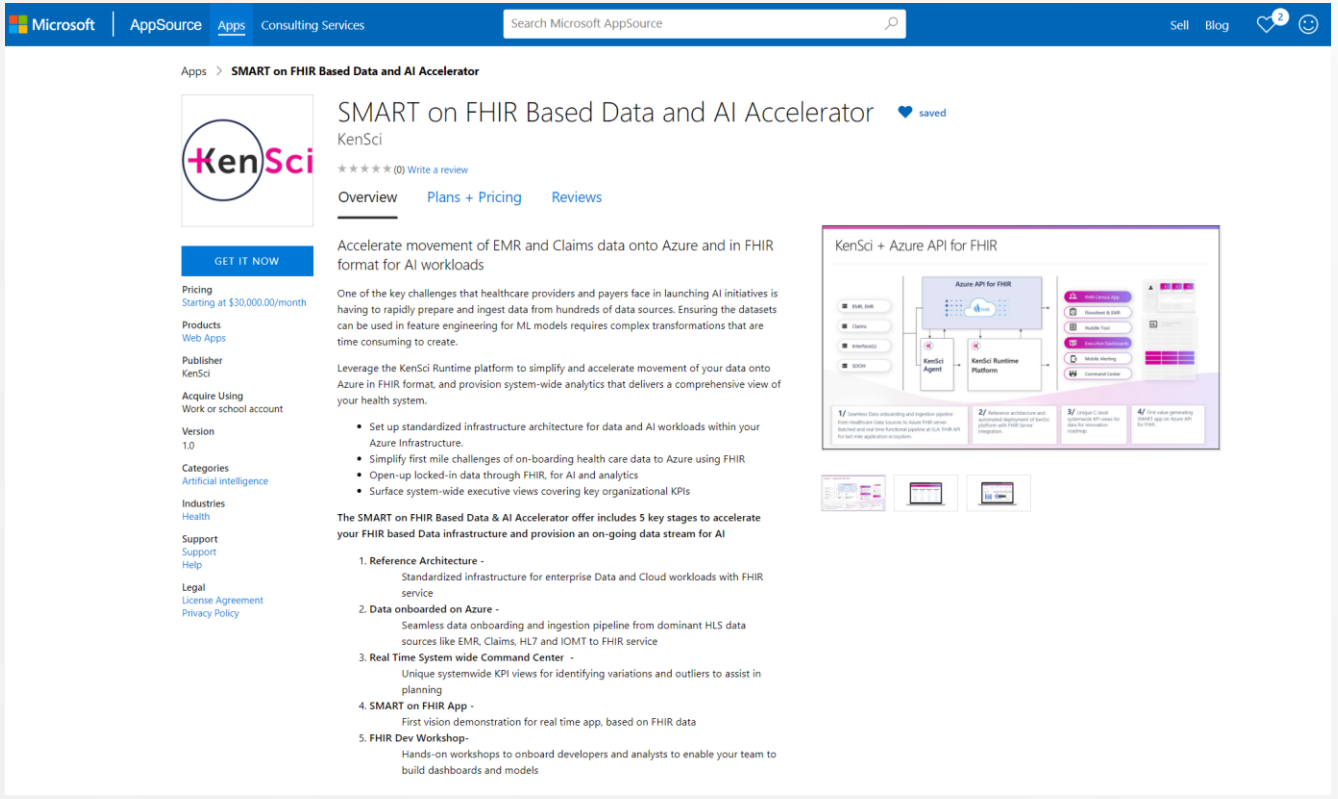
Reference Architecture for Azure based FHIR infrastructure supporting Command center



Azure Marketplace Offering Link

Blog Post Link

Contact Sunny@kensci.com or Stephav@Microsoft.com



Technical Requirements

Can be deployed in 48 hours, if the customer can provide→

1. Dedicated Azure Sub in Customer Tenant
2. 2 Service Principals & 2 Reg. Applications (Need AAD Global Admin to approve)
3. Deployment of following Azure Services:
    a. Azure SQL
    b. Azure Service Bus Namespace
    c. Azure Service Bus Topic
    d. Azure Functions
    e. Azure Kubernetes Services & Containers
    f. Azure DataBricks
    g. Azure Network Gateway
    h. Microsoft FHIR Service
    i. Azure Virtual Network
    j. Public IPs for Azure Services
    k. Azure Analysis Services
4. B2B access to KenSci DevOps team to install and operate the platform
5. Deployment of On Premise Services (Can be hosted in azure if network connectivity exists)
    a. Minimum 32GB of RAM, 6 Proc(s), RedHat / CentOS Linux 7.2 or Above; For windows, Server 2016 or above (VM ok)
        i. (Linux or Windows) Agent Ken Direct Connect Agent (EMR Data Warehouse Connector)
        ii. (Linux or Windows) Agent Ken Realtime Agent (HL7)
6. Access to EMR data to ingest into the KenSci Platform.
7. HL7 Feeds to support Mobile Command Center
        i. **HL7 Feeds *MUST* be compliant w/ HL7 specification for message version sent. Currently, we support HL7 2.5, 2.6, 2.7 & 2.8.**
        ii. **See https://www.hl7.org/implement/standards/product_section.cfm?section=13**
    b. ADT Feed (w/ all hospital scoped feeds)
    c. Orders Feed (w/ outbound lab orders sufficient for identification of key lab orders)
    d. Results Feed (return resulted labs for targeted labs)
    e. Misc. Feed w/ Information on Travel Screenings (In epic, this is a flowsheet feed)

Thank you

Sunny Neogi. Chief Growth Officer. KenSci. sunny@kensci.com

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Microsoft FY ‘18 and FY ‘19
Partner of the Year Finalist in Health

Microsoft Health
Innovation Awards 2018
WINNER

Microsoft Health
Innovation Awards 2019
WINNER