ACCESS POINT ANALYTICS

A Data Aggregation Platform for TCU Network Services

THE TEAM

JUSTIS CLARK

Project Manager & Developer

HUNG DOAN

Developer

RYAN FINNEGAN

Developer

MATT LIDDY

Data Scientist & Developer

BRADLEY SCHOENEWEIS

Technical Lead & Developer

OUTLINE

01 **INTRODUCTION & BACKGROUND**
Access Points & Key Performance Indicators

02 **THE PROJECT**
Requirements & Vision

03 **THE SOLUTION**
A High-Level View of the System

04 **PROJECT DEMO**
The Web Application In Action

05 **RETROSPECT**
Reviewing the Process & Lessons Learned

06 **QUESTION & ANSWER**
Concluding Thoughts

01

Introduction & Background

Access Points and Key Performance Indicators

ACCESS POINTS

ACCESS POINTS

- +3,200 Access Points (APs) across the TCU campus
- Data Aggregated into Cisco Prime

THE CLIENTS & THE ISSUE

TCU®
NETWORK SERVICES

CRAIG BAUGH
TONY FLEMING

- Overwhelming Data in Cisco Prime
- Long Response & Remedy Times

OVERWHELMING DATA

KEY PERFORMANCE INDICATORS (KPIs)

ANOMALY DETECTION

ACCESS POINT UTILIZATION

CHANNEL UTILIZATION

CLIENT COUNT

COVERAGE HOLES

POWER/CHANNEL UTILIZATION

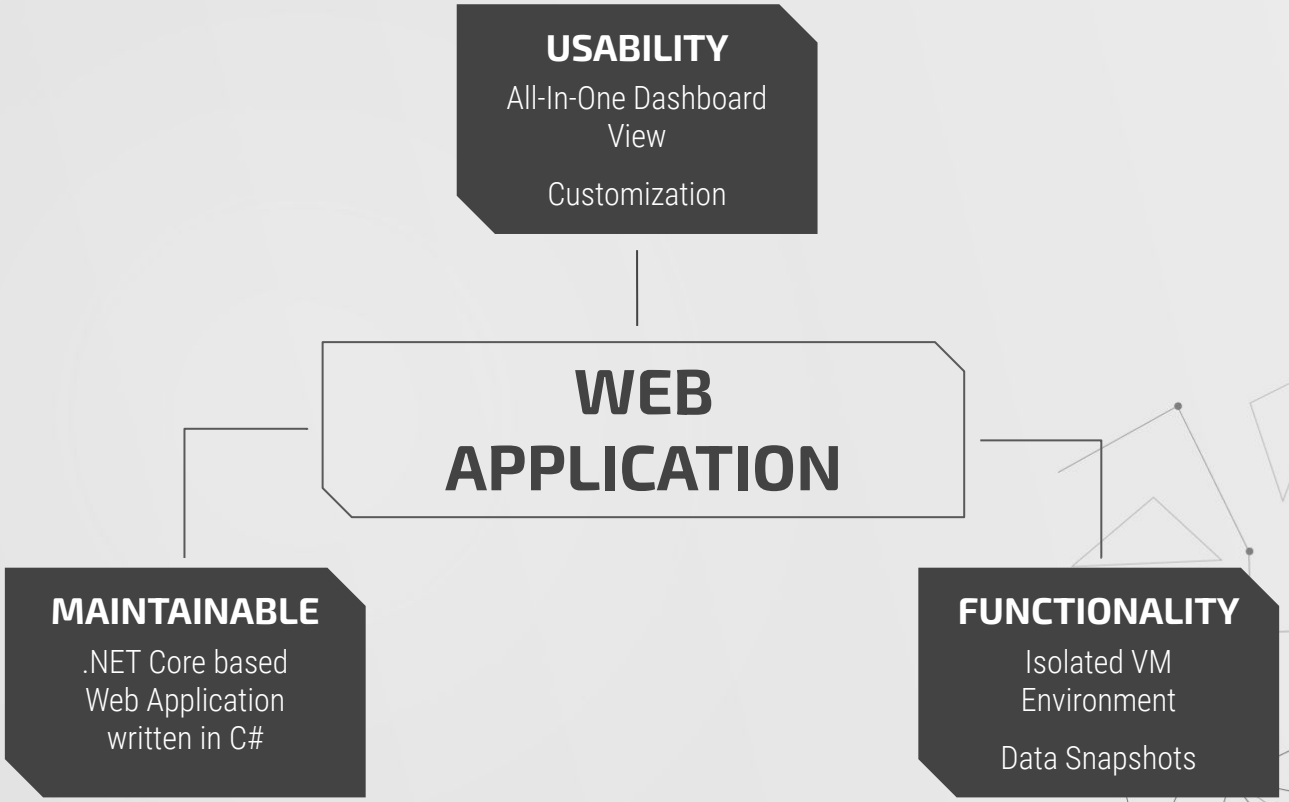
ROGUE ACCESS POINTS

02

THE PROJECT

Requirements & Vision

REQUIREMENTS



THE VISION

Our platform aims to provide proactive and reactive insights to TCU Network Services that are summarized, and actionable. These snapshot insights will be extracted from the massive data stream collected by wireless Access Points all over TCU's campus, and then presented through an internal Web-Application Interface.

03

THE SOLUTION

A High-Level View of the System

SOLUTION FOCUSES

AUTOMATION

Automatically ingest, analyze, and clean data related to the KPIs on an adjustable schedule

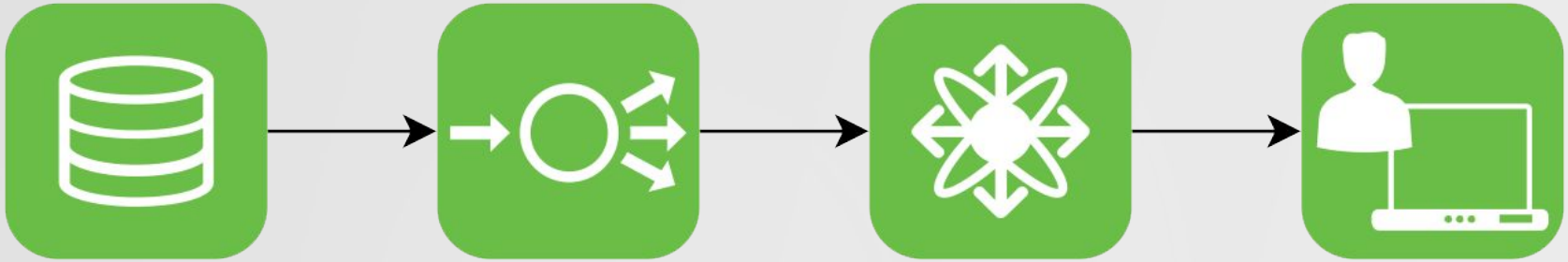
CONSOLIDATION

Gather and filter pertinent information for each KPI, while simultaneously performing calculations in real-time to keep the data true and reusable

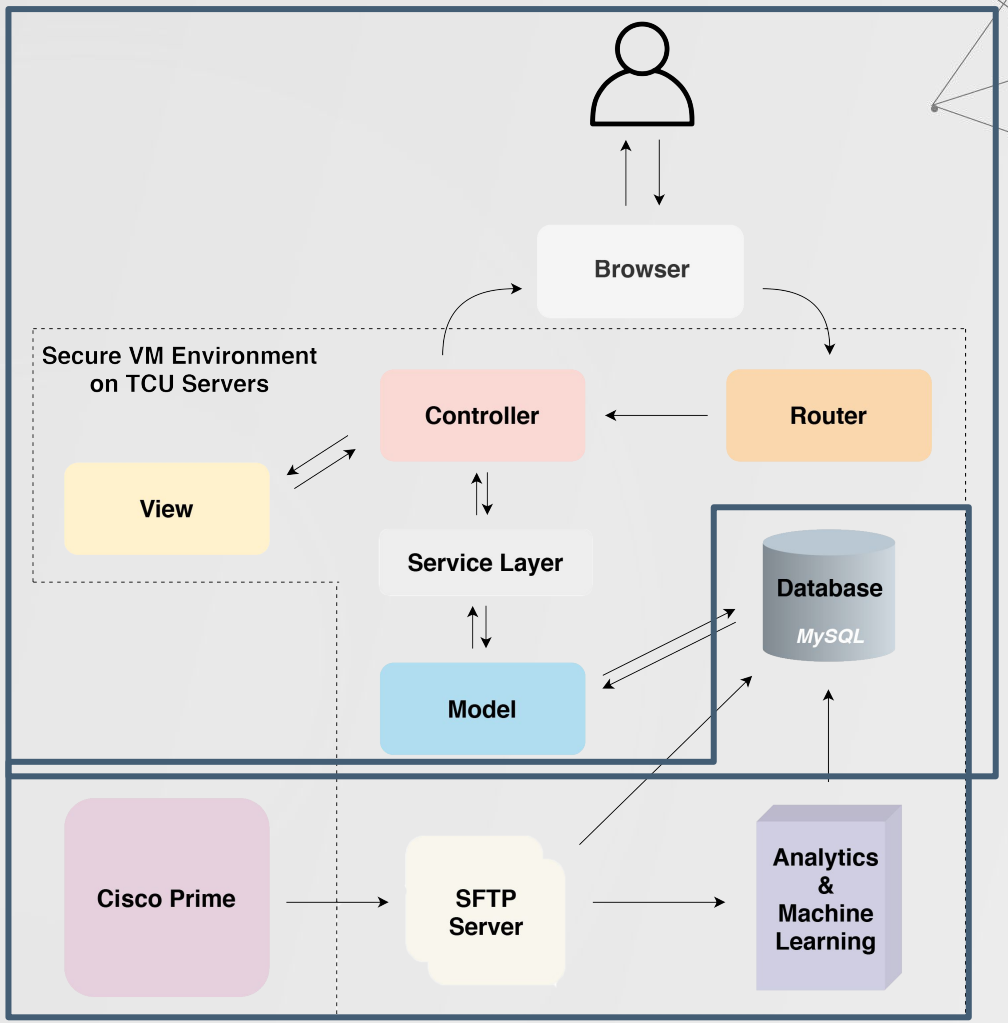
SIMPLIFICATION

Present the data to the user through information rich tables and clean data visualizations

PROCESS OVERVIEW



SYSTEM ARCHITECTURE



TECHNOLOGY STACK

C#

.NET Core

Cisco Prime

GitLab

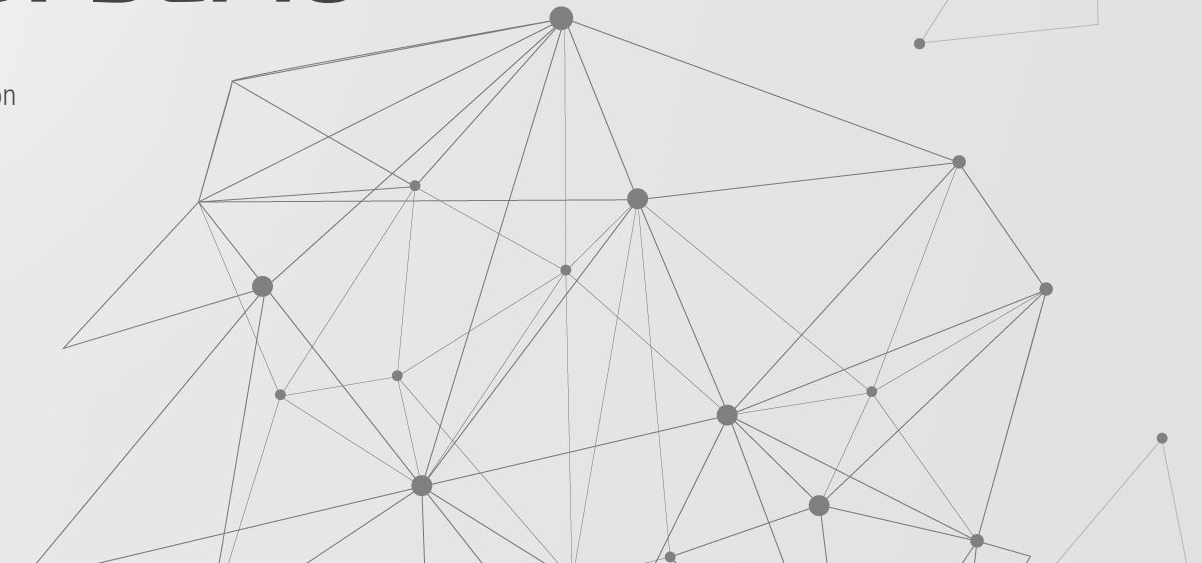
MySQL

JavaScript

04

PROJECT DEMO

The Web Application In Action

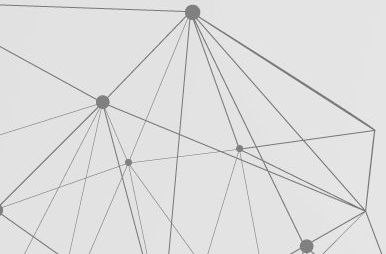


DEMO OUTLINE

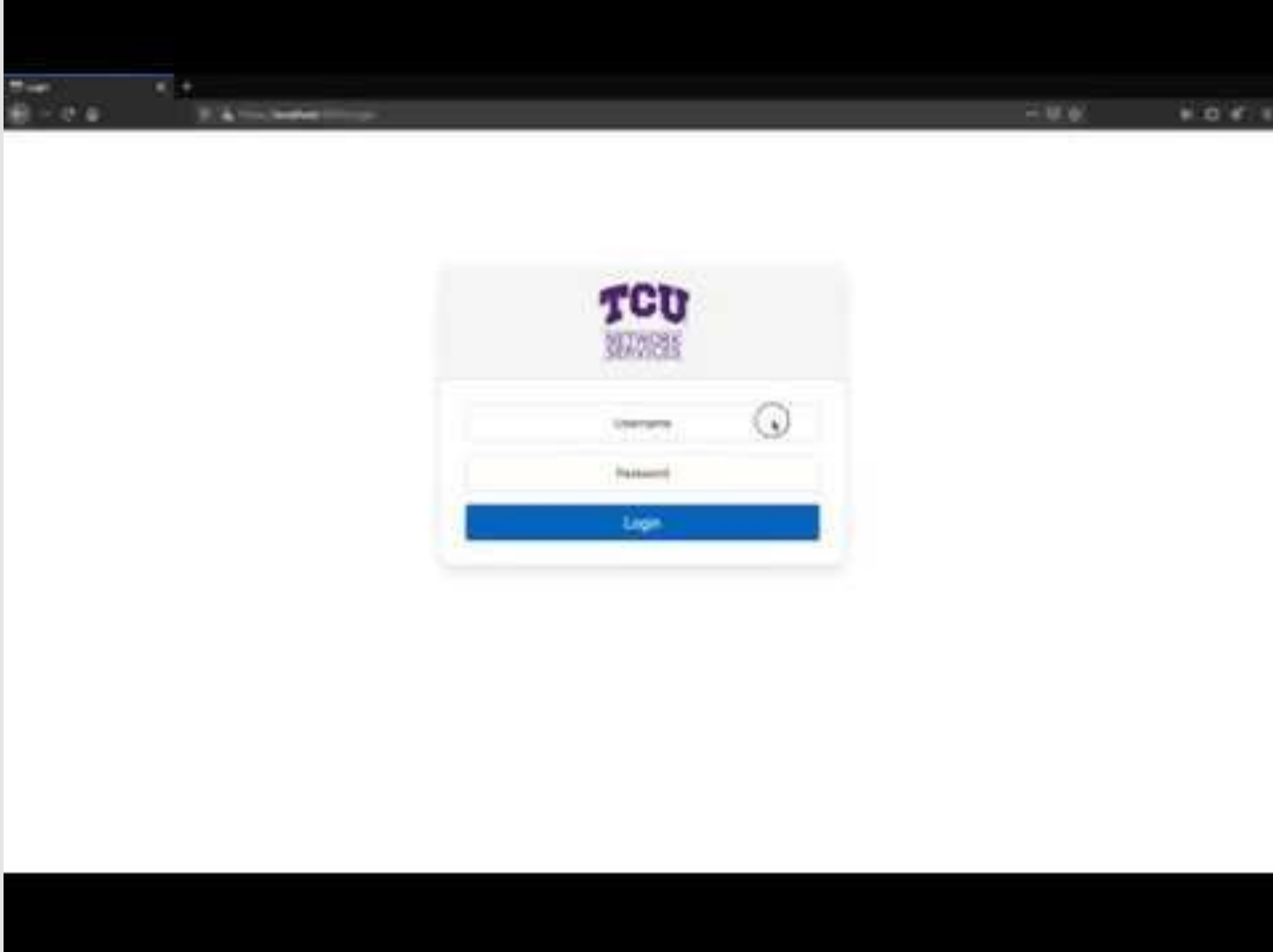
1 The Dashboard

2 The KPI Pages

3 The User System



DEMO - DASHBOARD OVERVIEW



DEMO - ANOMALY DETECTION

QUICK VIEW - ACCESS POINT UTILIZATION

TCU INFORMATION TECHNOLOGY | KPIs | admin

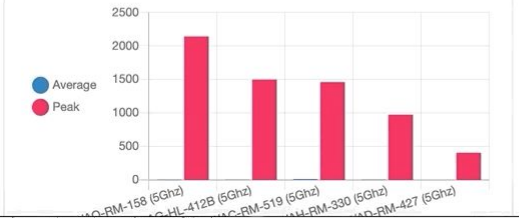
Access Point Utilization

Past Day | 2.4 GHz | Search by AP Name..

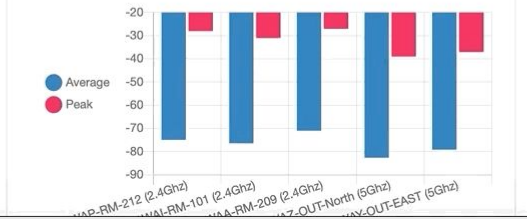
AP Name	Radio Type	Avg Clients	Peak Throughput	Avg Throughput	Peak RSSI	Avg RSSI	Peak SNR	Avg SNR	Ignore
MMA1WAC-HL-106	XOR (2.4GHz)	9.66	22.8	1.1400	-54	-70.6000	90	17.9000	
LUP2WAC-RM-205	XOR (2.4GHz)	8.01	0.11	0.0100	-36	-36.8500	61	58.1200	
PAL2WAD-RM-226	802.11b/g/n	7.22	4.29	0.0900	-31	-44.7600	65	47.8700	
SHE3WAI-RM-312	XOR (2.4GHz)	5.9	0.12	0.0300	-46	-58.9100	42	23.0000	
MON4WAC-RM-416	XOR (2.4GHz)	5.75	2.51	0.2100	-29	-39.7200	61	47.1800	
SWR4WAH-RM-420	XOR (2.4GHz)	4.56	0.31	0.0200	-48	-67.3300	40	24.6300	
LIB3WAF-HL-3141	802.11b/g/n	4.05	0.02	0.0100	-50	-53.7500	43	35.5000	
MUL2WAA-RM-210	XOR (2.4GHz)	3.98	0	0.0000	-55	-55.0000	39	37.0000	
LIB2WAI-RM-2230	802.11b/g/n	3.81	1.08	0.0500	-33	-51.9000	55	34.2300	
CLA3WAB-RM-312	XOR (2.4GHz)	3.73	0	0.0000	-54	-54.0000	36	36.0000	

1/264

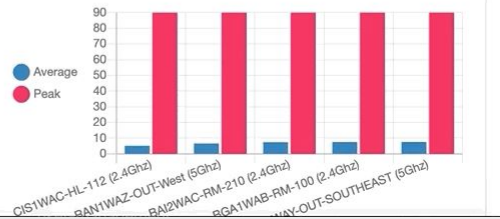
Top 5 Avg. vs. Max Throughput Differences



Top 5 Avg. vs. Max RSSI Differences



Top 5 Avg. vs. Max SNR Differences



QUICK VIEW - CHANNEL UTILIZATION

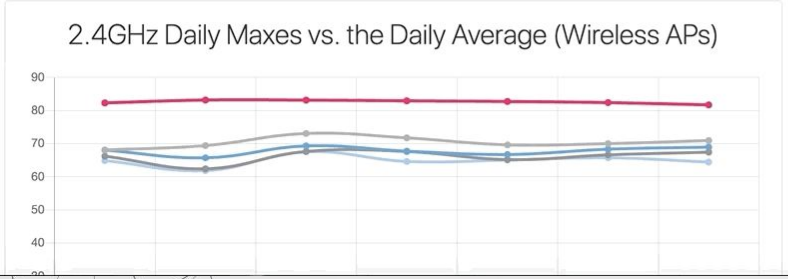
TCU INFORMATION TECHNOLOGY | KPIs | admin

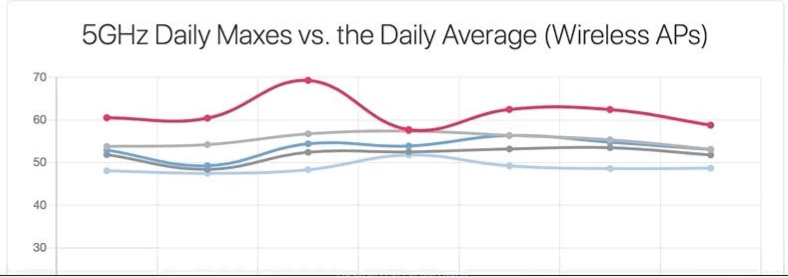
Channel Utilization

Past Day | Wireless Access Points | 2.4 GHz | Search Channel Utilization...

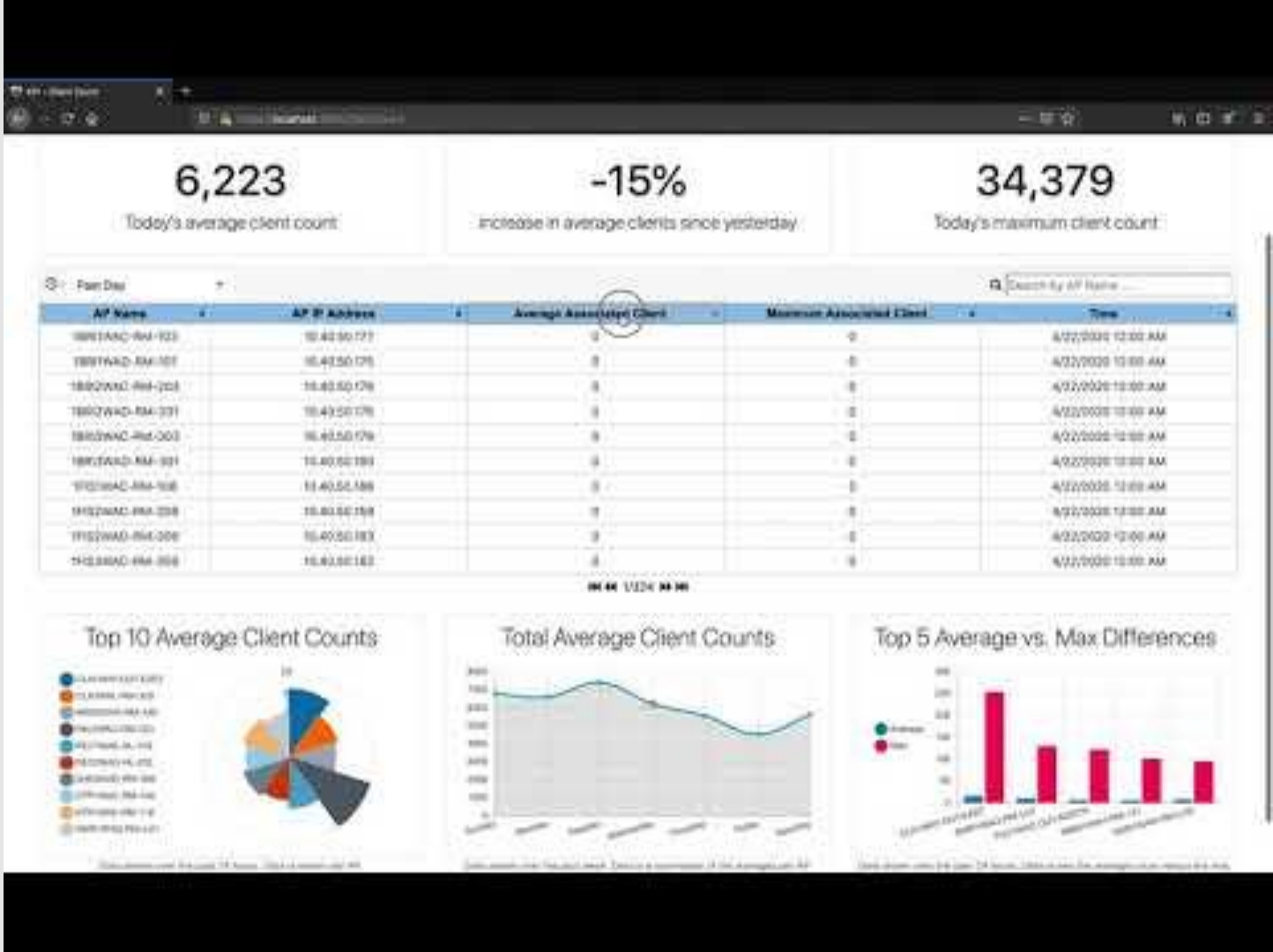
AP Name	Radio Type	Channel #'s	Channel Util	RX Util	TX Util	Time
FA21WAZ-OUT-North	802.11b/g/n	6	83.1818	0.0000	0.0909	4/27/2020 07:11 AM
KIN1WAZ-OUT-North	802.11b/g/n	6	69.4286	0.0260	4.9870	4/27/2020 07:11 AM
REC1WAY-OUT-North	802.11b/g/n	6	65.7368	0.0000	6.6711	4/27/2020 07:11 AM
SHE1WAZ-OUT-South	802.11b/g/n	6	62.4247	0.0000	5.2877	4/27/2020 07:11 AM
AVO1WAW	802.11b/g/n	6	61.8831	0.0000	0.0000	4/27/2020 07:11 AM
FOS1WAZ-OUT-North	802.11b/g/n	6	61.2466	0.0000	2.5616	4/27/2020 07:11 AM
AVO1WAV	802.11b/g/n	1	59.7403	0.0000	0.0000	4/27/2020 07:11 AM
AVO1WAZ	802.11b/g/n	6	58.7792	0.0000	0.0000	4/27/2020 07:11 AM
GMS6WAQ-RM-613	XOR (2.4GHz)	11	57.6364	0.0130	0.3896	4/27/2020 07:11 AM
CLA1WAZ-OUT-West	802.11b/g/n	6	56.7143	0.0000	6.9481	4/27/2020 07:11 AM

1/312

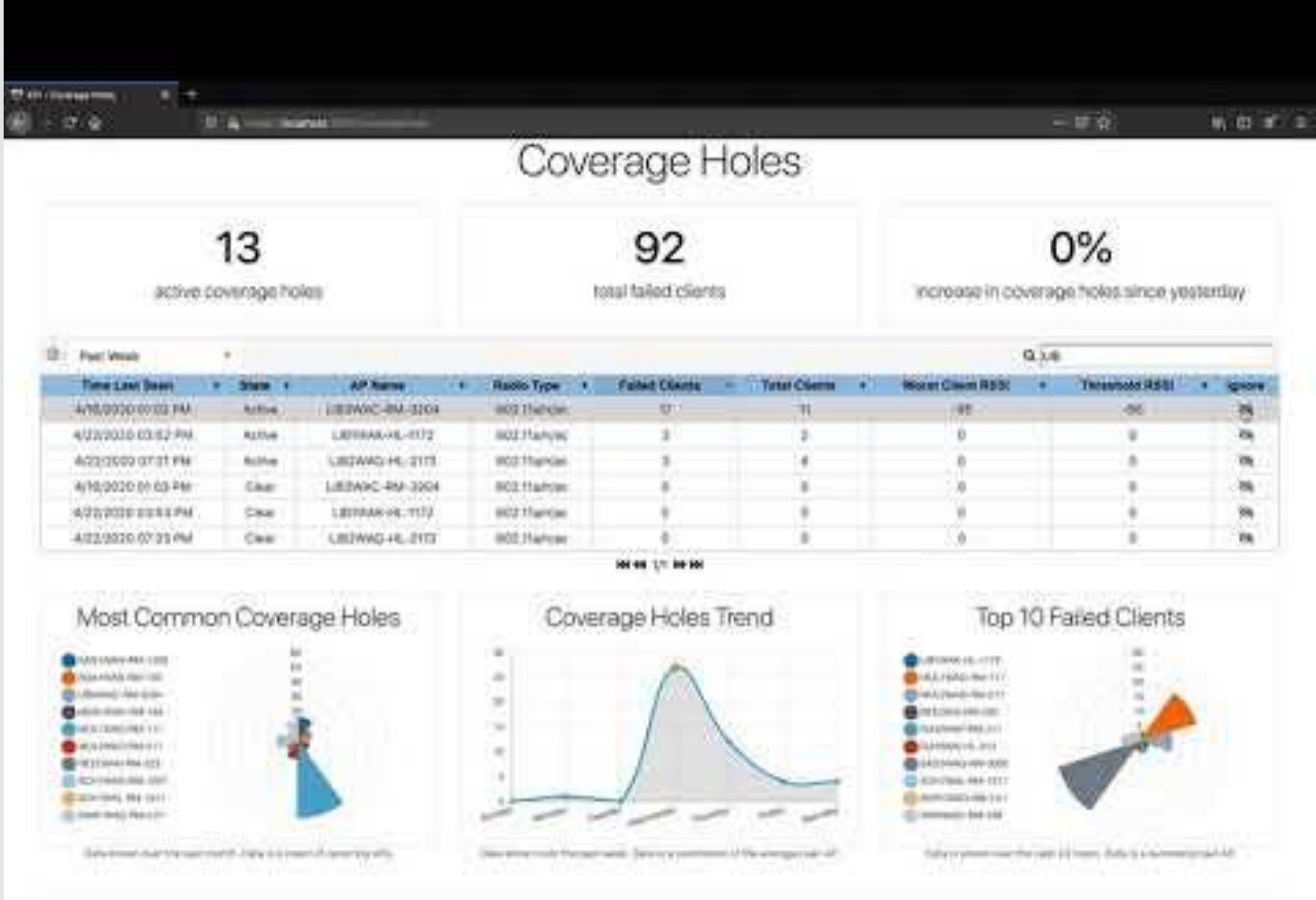




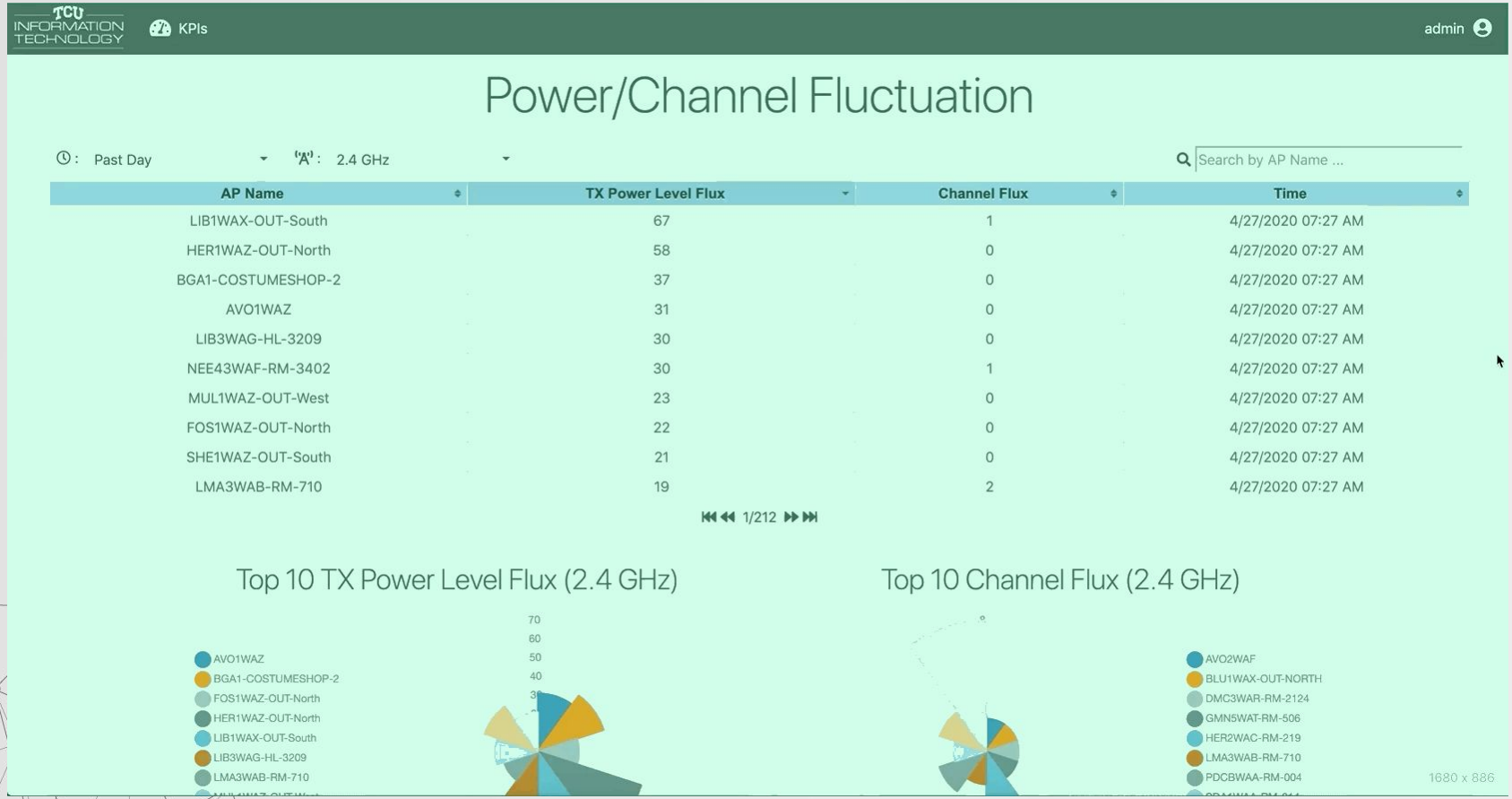
DEMO - CLIENT COUNT



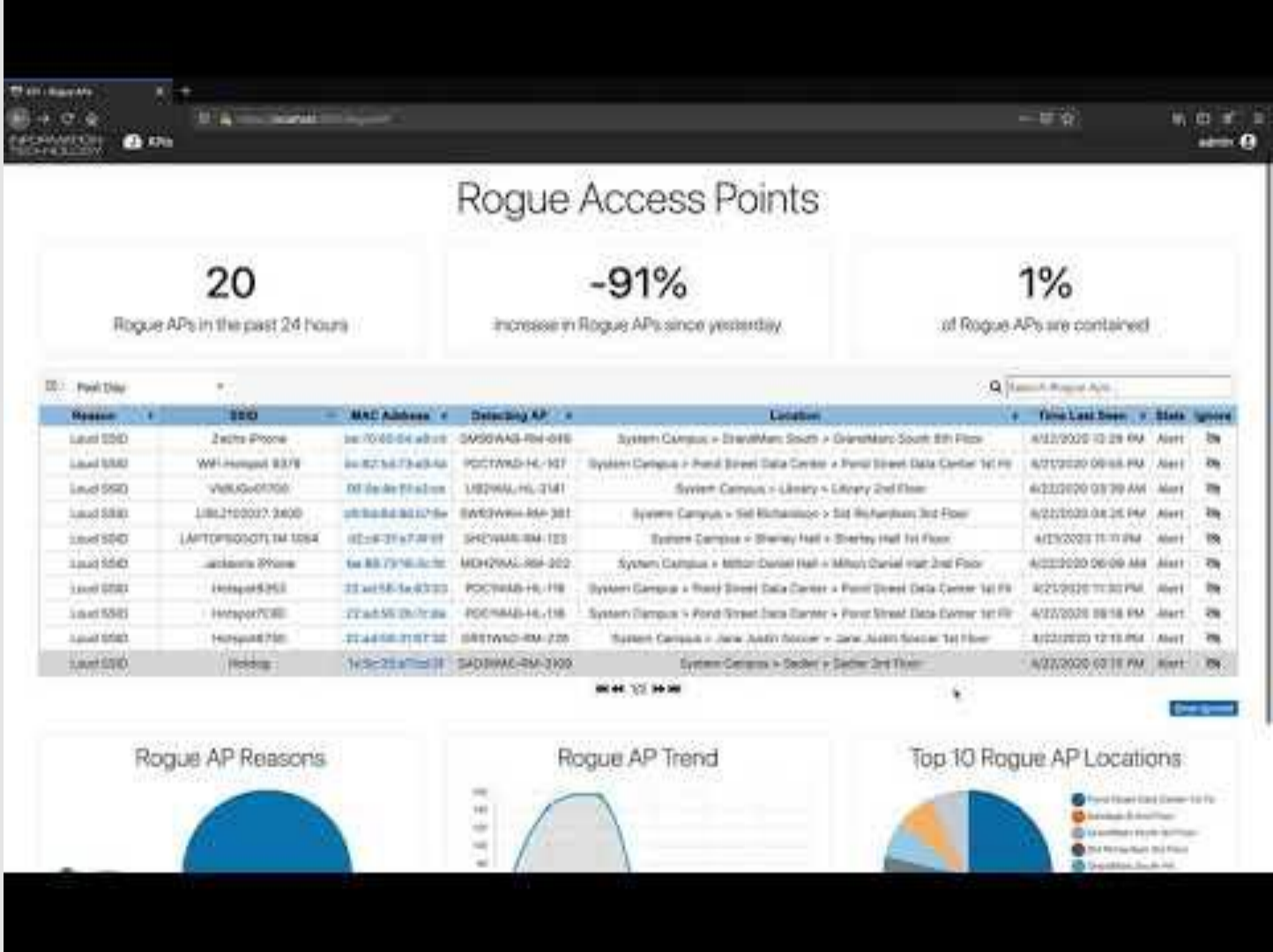
DEMO - COVERAGE HOLES



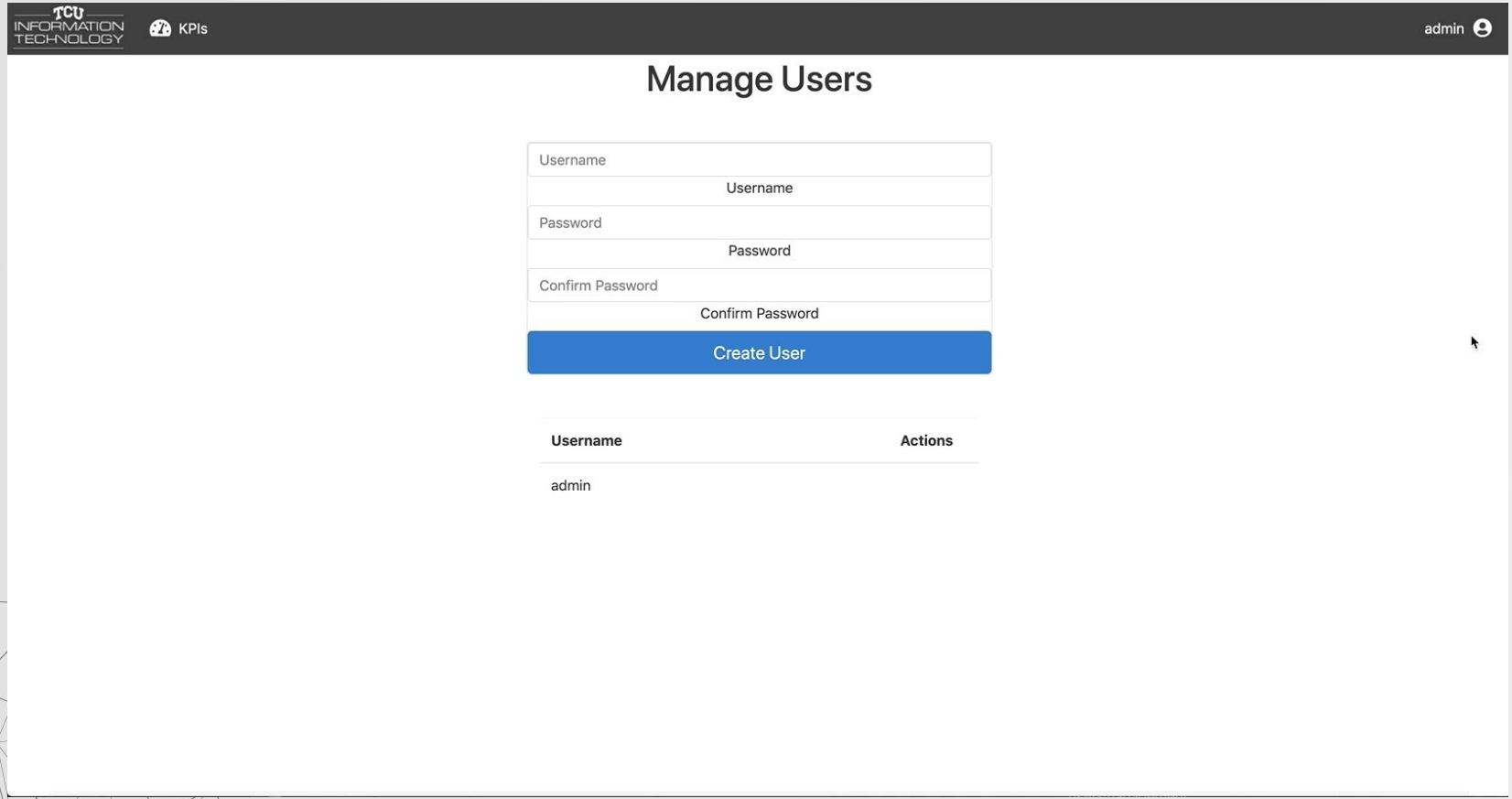
QUICK VIEW - POWER/CHANNEL FLUCTUATION



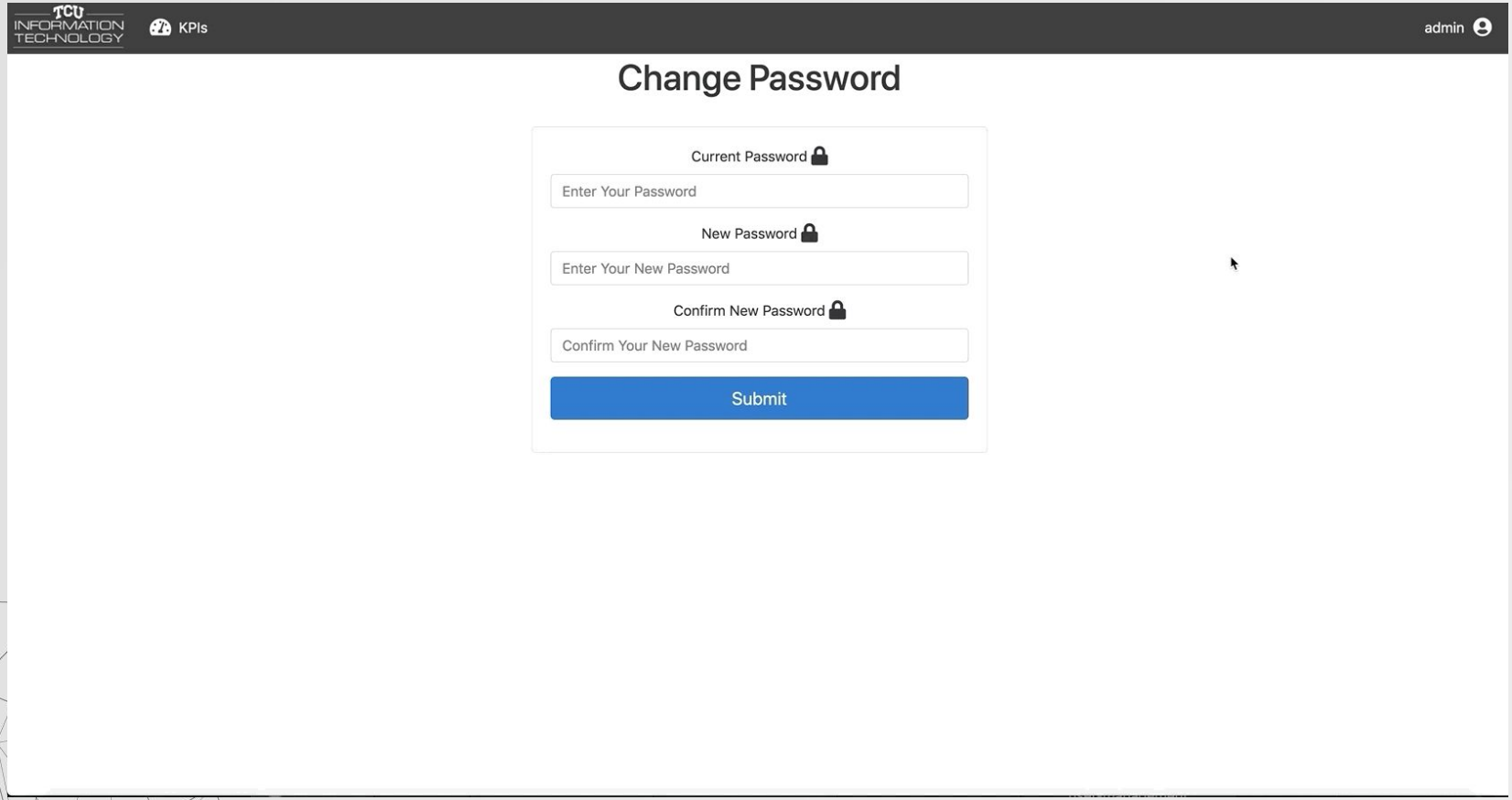
DEMO - ROGUE ACCESS POINTS



QUICK VIEW - USER MANAGEMENT



QUICK VIEW - USER SETTINGS



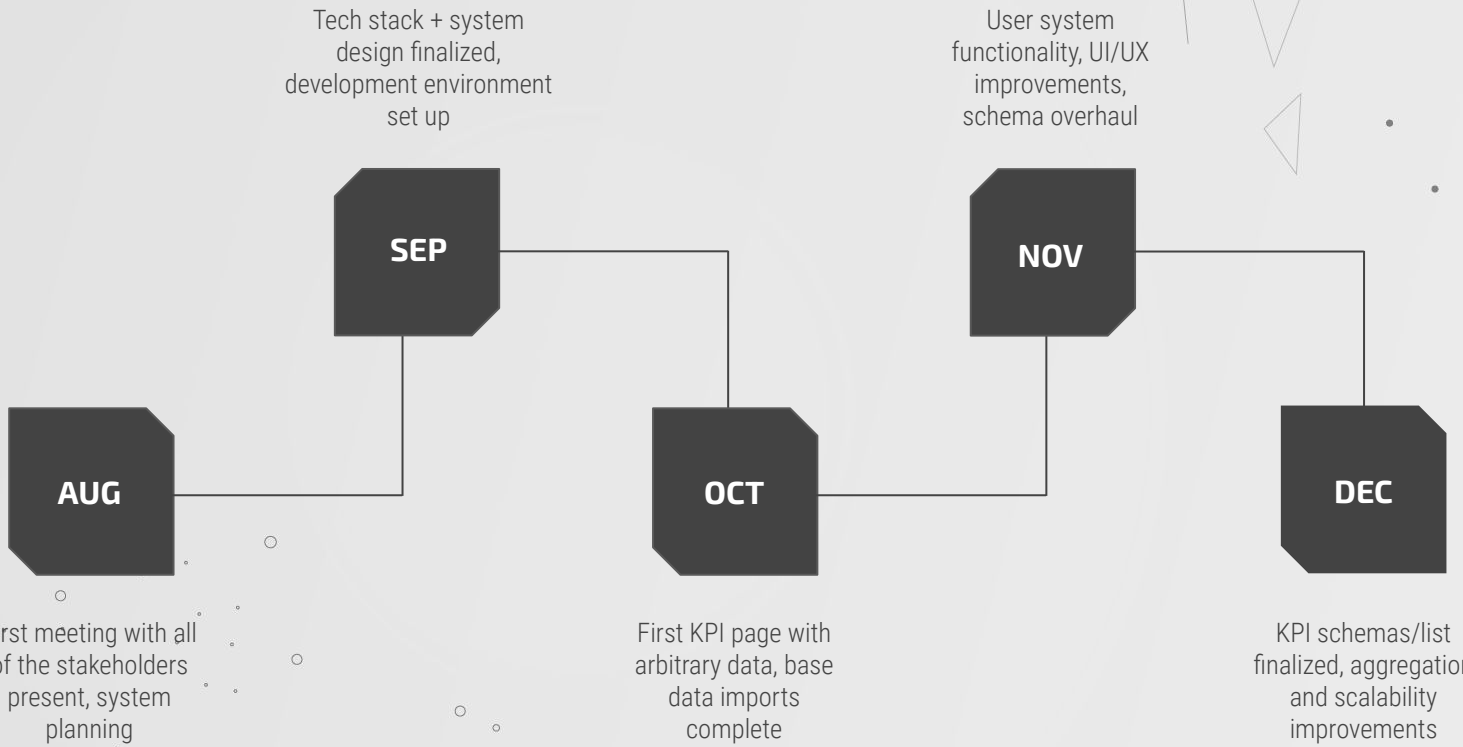
05

RETROSPECT

Reviewing the Process & Lessons Learned

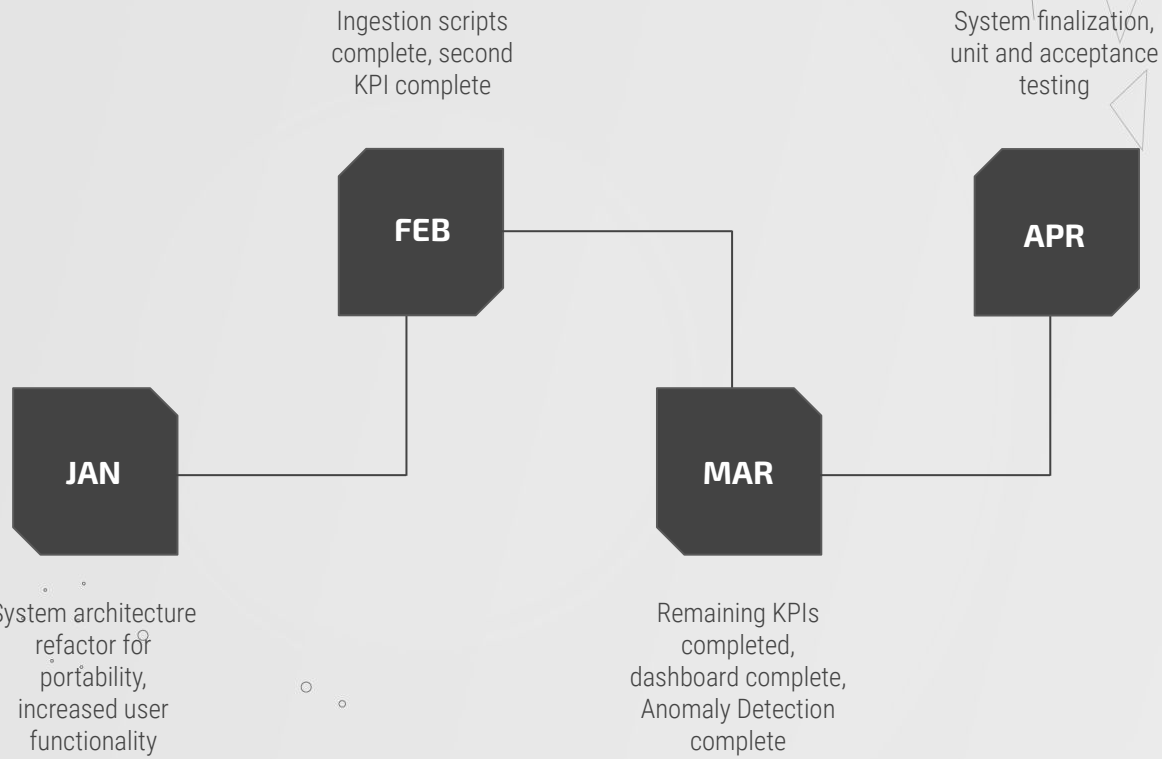
TIMELINE HIGHLIGHTS

FIRST SEMESTER



TIMELINE HIGHLIGHTS

SECOND SEMESTER



PROJECT TAKEAWAYS

TECHNOLOGIES

.NET Core
C#
JavaScript/jQuery
Git

BEST PRACTICES

System design
Coding principles
Documentation
Testing

SOFT SKILLS

Time management
Adaptability
Communication

LESSONS LEARNED

Communication can be difficult
Strategic delegation
Visibility of work is key

THE FUTURE

- Transfer over to a TCU development team
- Deployment on a production server
- Ever-improving Anomaly Detection

06

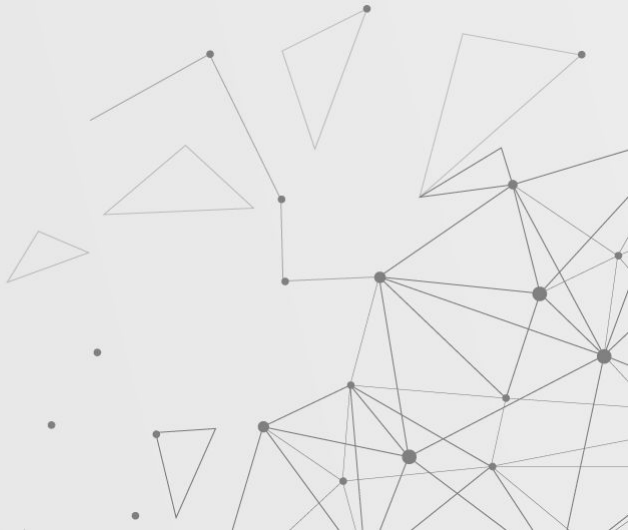
QUESTION & ANSWER

Concluding Thoughts

ACKNOWLEDGEMENTS

Our team would like to thank TCU Network Services, specifically Craig Baugh and Tony Fleming for letting us be creative and giving us the opportunity to develop this Web-Application.

We'd also like to thank Dr. Bingyang Wei for his dedication to our class and our team, even through the unorthodox final semester we've had, and the COSC & CITE Faculty for supporting us these past 4 years.



THANK YOU!