

Reliability Engineering Environment

D2 Information Systems and Telecommunication PS1

Question 1.8: What are the methods of adaptation and scaling of intelligent decision supporting systems in order to keep the system operable for a long period under the changing operation conditions (technological process, market conditions, regulatory requirements, etc.)? How can we describe the lifecycle of sustainable intelligent decision supporting system in the power industry

Tom Helmer USA



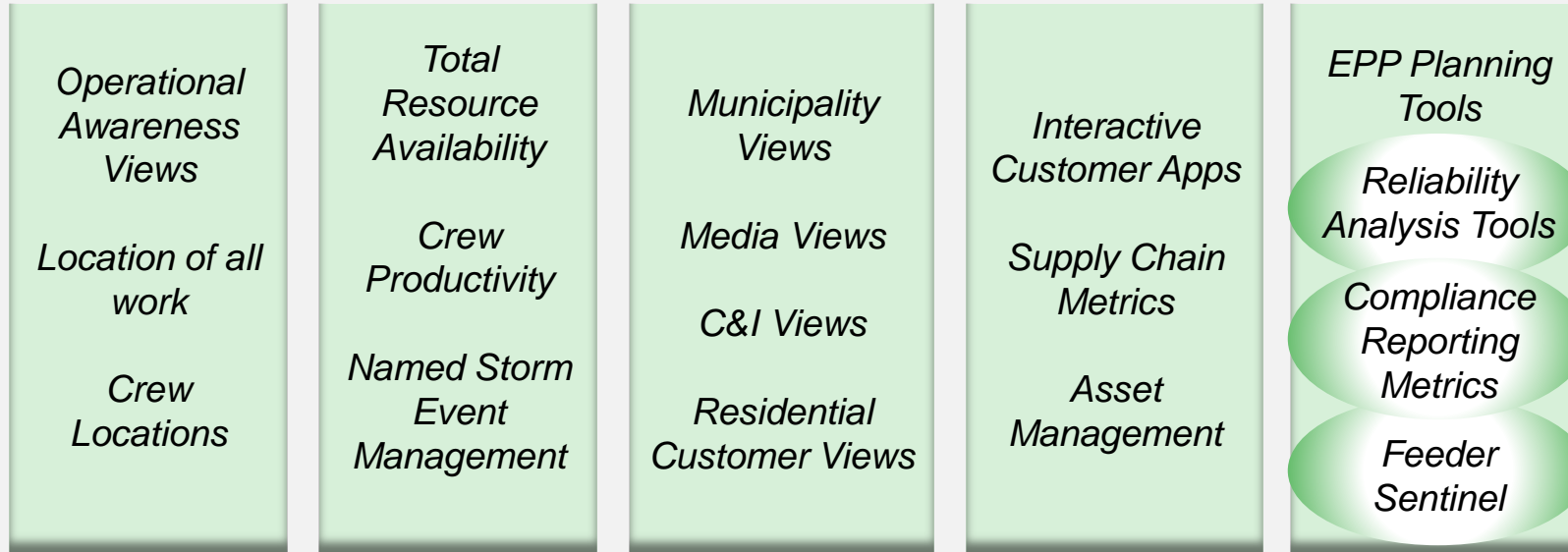
Reliability Engineering Environment

- Allows engineers to harvest all digital and human collected information
 - **Outage** cause codes, frequencies, durations, locations, customer counts
 - Feeder level impacts on outage indices: **SAIFI and SAIDI**
 - **Preventative Maintenance** (PM) results
 - **Substation Automation** operational, non-operational, missed operation waveforms, digital signatures
 - **Distribution Automation** operational, non-operational, digital signatures
 - **SCADA Historian** (PI) historic feeder and device behavior and condition information
 - **Distribution Planning/Engineering** System feeder forecasted utilizations, reliability behavior
 - **AMI power quality** issues, outage durations, outage frequencies, usage
 - **ADMS historic usage**: feeder or subsection of feeder view of how long running and how much above rated thermal capacity at what temperature, actual feeder utilizations, actual feeder configurations
 - Potentially other digital sources of feeder information as they get deployed: **DERMS, DRMS**

HIGH LEVEL | Reliability Engineering Environment Architecture

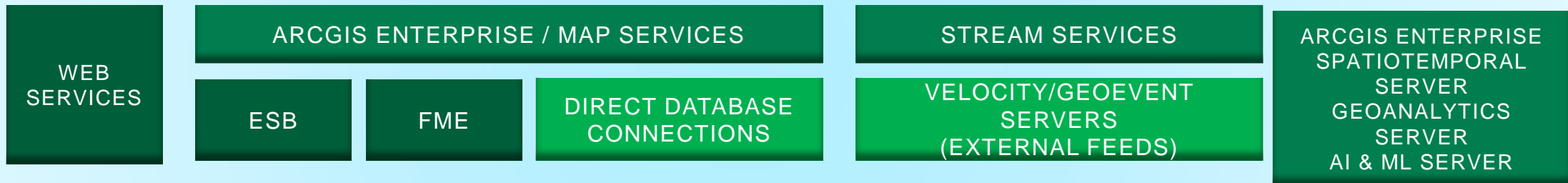


BUSINESS FUNCTIONALITY



UDC WEB APP BUILDER DASHBOARD WIDGETS

FOUNDATION Esri ArcGIS Enterprise Platform



OPERATIONAL SYSTEMS

DPS

OMS

MWM

SCADA HISTORIAN

DA/SA

ADMS

EAM

AMI

DERMS

DRMS

EXTERNAL DATABASES

WEATHER

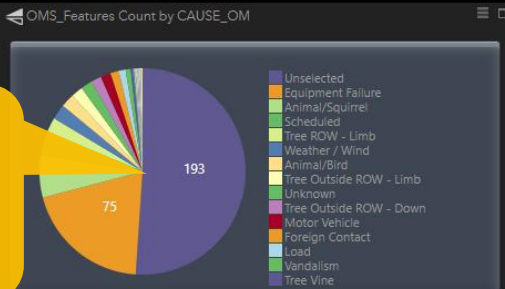
Reliability Engineering Environment



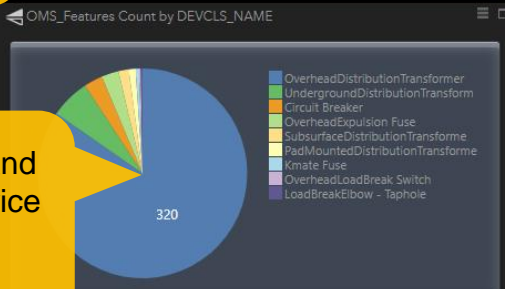
Date Filter

Date Range
01/01/2017 - 12/31/2017

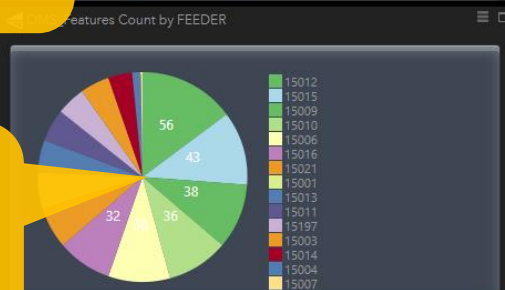
Outage Counts and Durations by Cause Code (OMS)



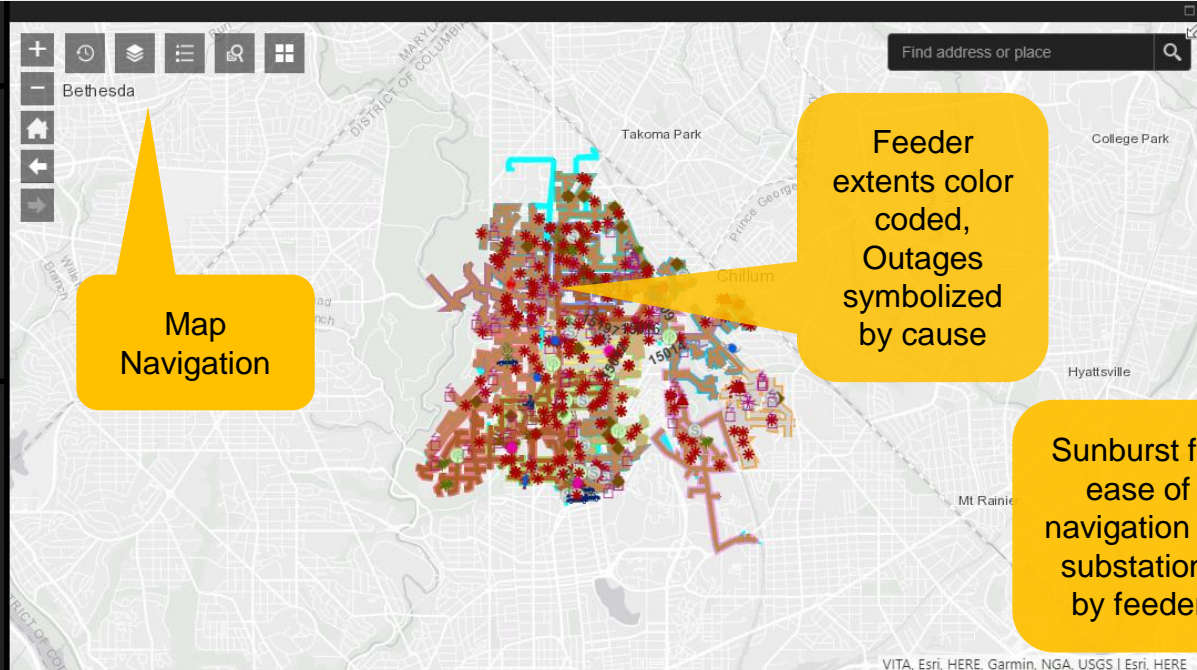
Outage Count and Duration by Device Type (OMS)



Outage Counts and Duration by Feeder (OMS)



Map Navigation

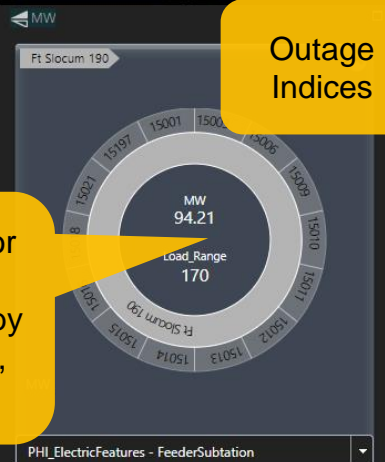


Feeder extents color coded, Outages symbolized by cause

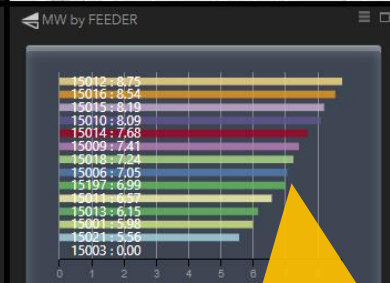
Sunburst for ease of navigation by substation, by feeder



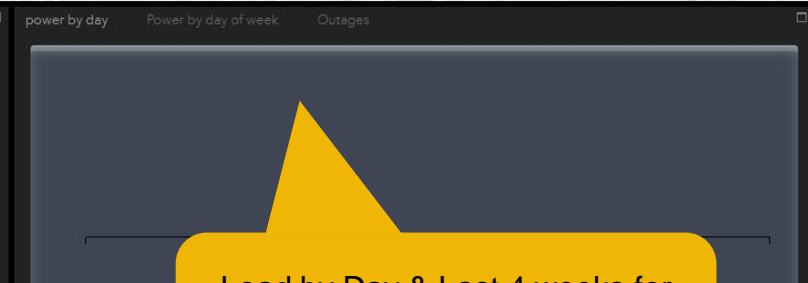
Outage Indices



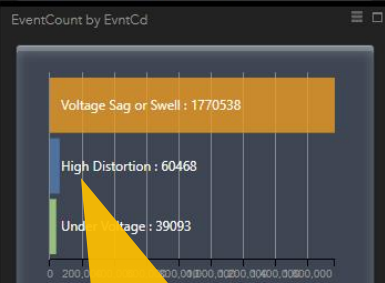
Highest %Loaded Feeders (PI OLEDB Linked Server)



Load by Day & Last 4 weeks for selected Feeder (PI OLEDB Linked Server)



PQ event count by event code (AMI)



Reference Framework

Esri ArcGIS Enterprise Platform

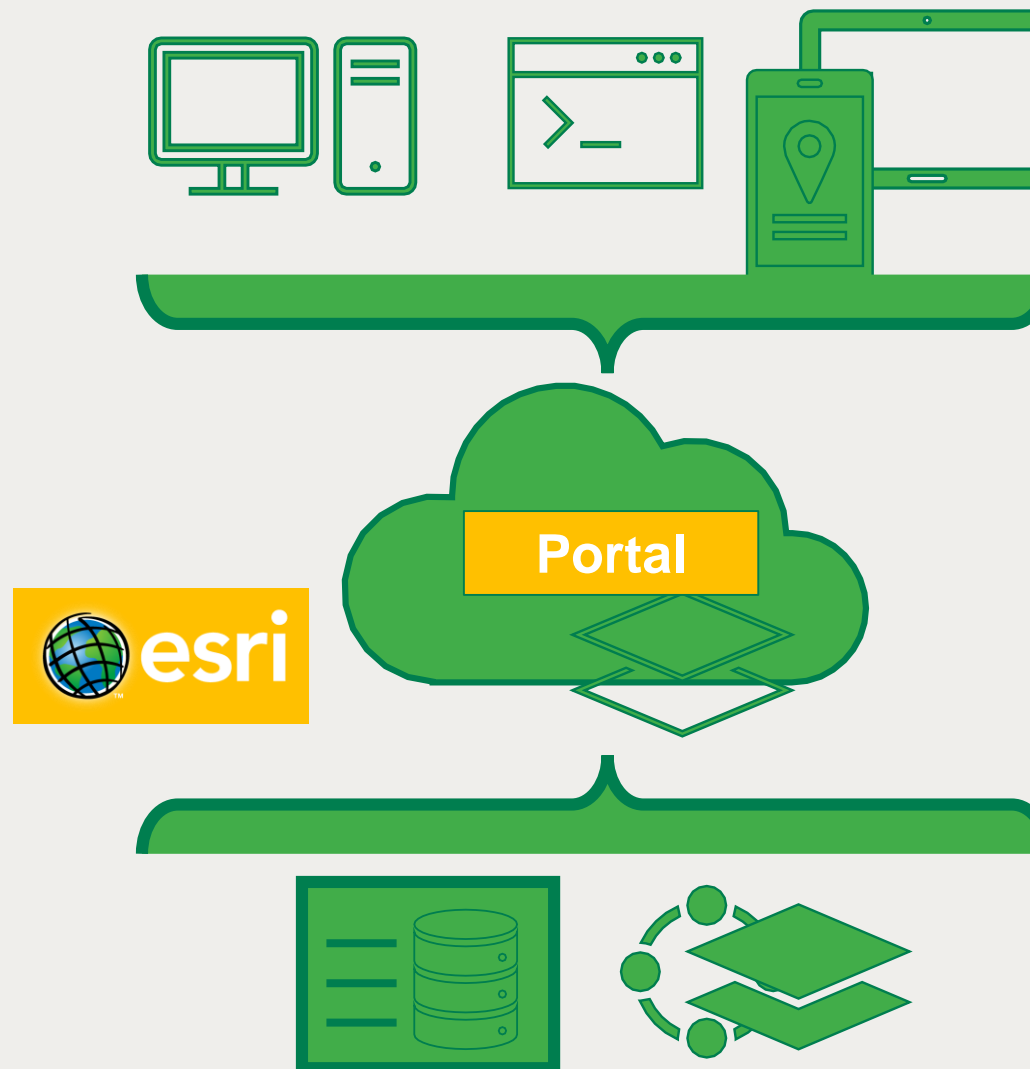
Fully leverages the complete ArcGIS Enterprise Platform

Provides Scalability

Provides Support for Big Data, GeoAnalytics, AI & ML, IoT Streaming

Functionality to the field and back including web and mobile

Supports Outage Communications, Reliability & Interruption Analysis, Work & Asset Management Analysis & Reporting



High-Level Architecture

UDC value add in blue

