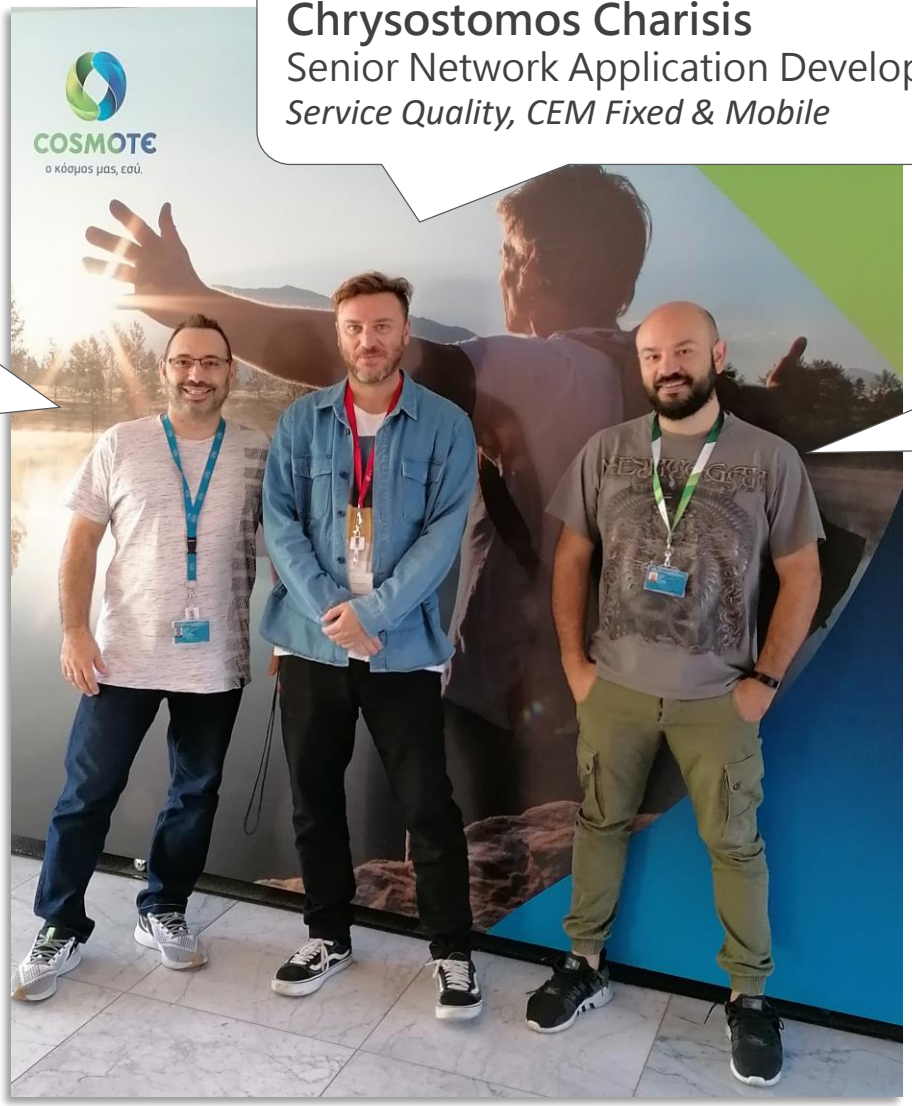
Digital Analytics Meetup

Who we are

Chrysostomos Charisis
Senior Network Application Developer
Service Quality, CEM Fixed & Mobile

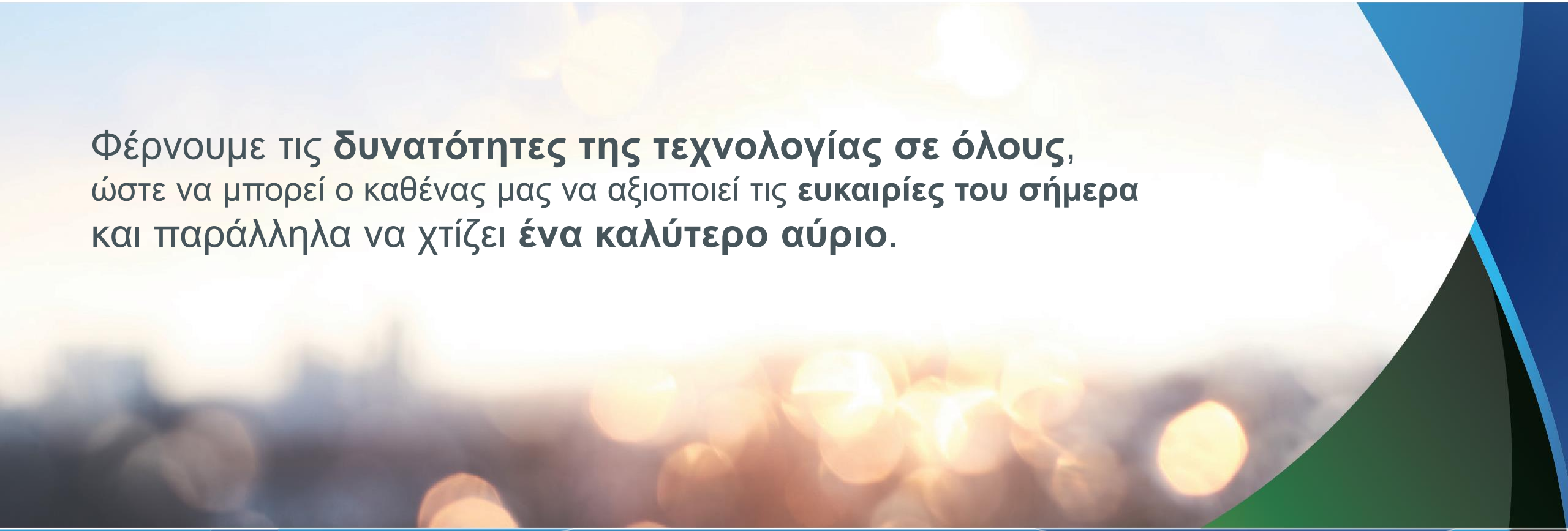
Socrates Tsouplakis
Senior Voice Support Engineer
Network Support Section Northern Greece



Konstantinos Boletis
Senior Group Leader
Access Network Telecommunication Systems Support

Ένας κόσμος, καλύτερος για όλους

COSMOTE
Ένας κόσμος, καλύτερος για όλους.



Φέρνουμε τις **δυνατότητες της τεχνολογίας σε όλους**,
ώστε να μπορεί ο καθένας μας να αξιοποιεί τις **ευκαιρίες του σήμερα**
και παράλληλα να χτίζει **ένα καλύτερο αύριο**.

ΟΜΙΛΟΣ ΟΤΕ

. Ο μεγαλύτερος τηλεπικοινωνιακός πάροχος στην Ελλάδα &

από τους κορυφαίους τηλεπικοινωνιακούς παρόχους στη ΝΑ Ευρώπη

.Μέλος του Ομίλου της Deutsche Telekom

.Απασχολεί πάνω από 13.500 εργαζόμενους στην Ελλάδα

.Δραστηριότητες: Σταθερή τηλεφωνία, (φωνή, Internet, δεδομένα), τηλεόραση & κινητή τηλεφωνία σε Ελλάδα και Ρουμανία. Στην Ελλάδα επιπλέον, υπηρεσίες ακινήτων, εκπαίδευσης και τηλεπικοινωνιακές λύσεις για την ελληνική και διεθνή βιομηχανική ναυτιλία

.Απευθύνεται σε ιδιώτες, επιχειρήσεις και παρόχους

Cellular Network Evolution

1G	2G	3G	4G	5G
0 data transfer	up to 385 kbps	up to 42 Mbps	up to 1 Gbps	up to 100 Gbps

The Landscape of 5G

5G will differentiate itself by delivering various improvements:

10x

Decrease in latency:
Delivering latency as low as 1 ms.

10x

Connection density:
Enabling more efficient signaling for IoT connectivity.

10x

Experienced throughput:
Bringing more uniform, multi-Gbps peak rates.

3x

Spectrum efficiency:
Achieving even more bits per Hz with advanced antenna techniques.

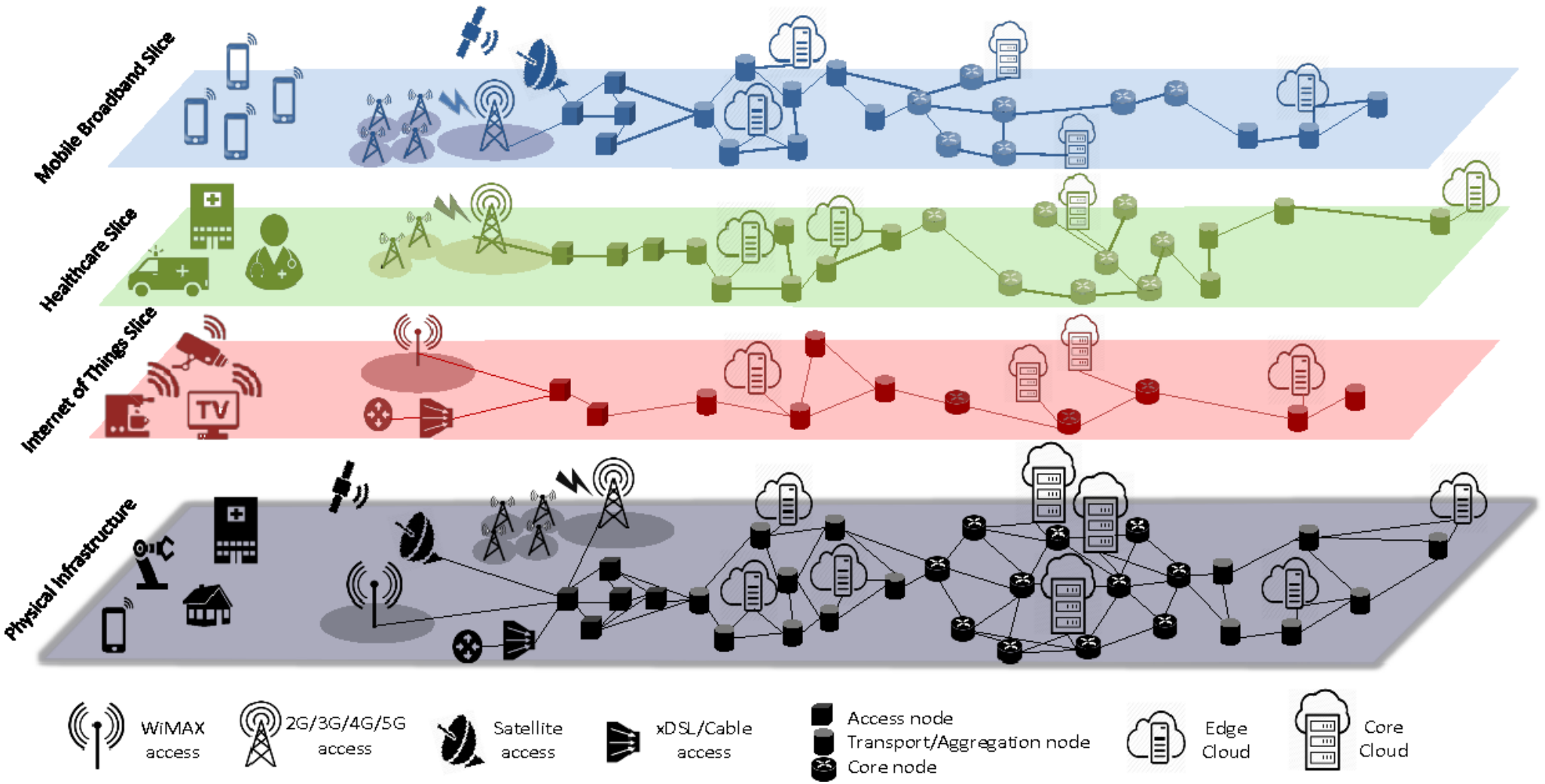
100x

Traffic capacity:
Driving network hyper-densification with more small cells everywhere.

100x

Network efficiency:
Optimizing network energy consumption with more efficient processing.

5G Slicing


Mobile Broadband Slice
Healthcare Slice
Internet of Things Slice
TV
Physical Infrastructure
WiMAX access
2G/3G/4G/5G access
Satellite access
xDSL/Cable access
Access node
Transport/Aggregation node
Core node
Edge Cloud
Core Cloud

5G Use Case

COSMOTE
Ένας κόσμος, καλύτερος για όλους.
COSMOTE
Ένας κόσμος, καλύτερος για όλους.

OTE Group Research & Innovation (R&I)

We are participating in 19 out of 54 EU funded 5G-PPP projects aiming at the design and implementation of advanced 5G infrastructures and the demonstration of innovative services/applications. The active participation in EU 5G projects empowers OTE Group to play a significant role in the 5G-PPP initiative helping reinforce European industry to successfully compete on global markets and open up new innovation opportunities.

The Destination

Supreme User Experience

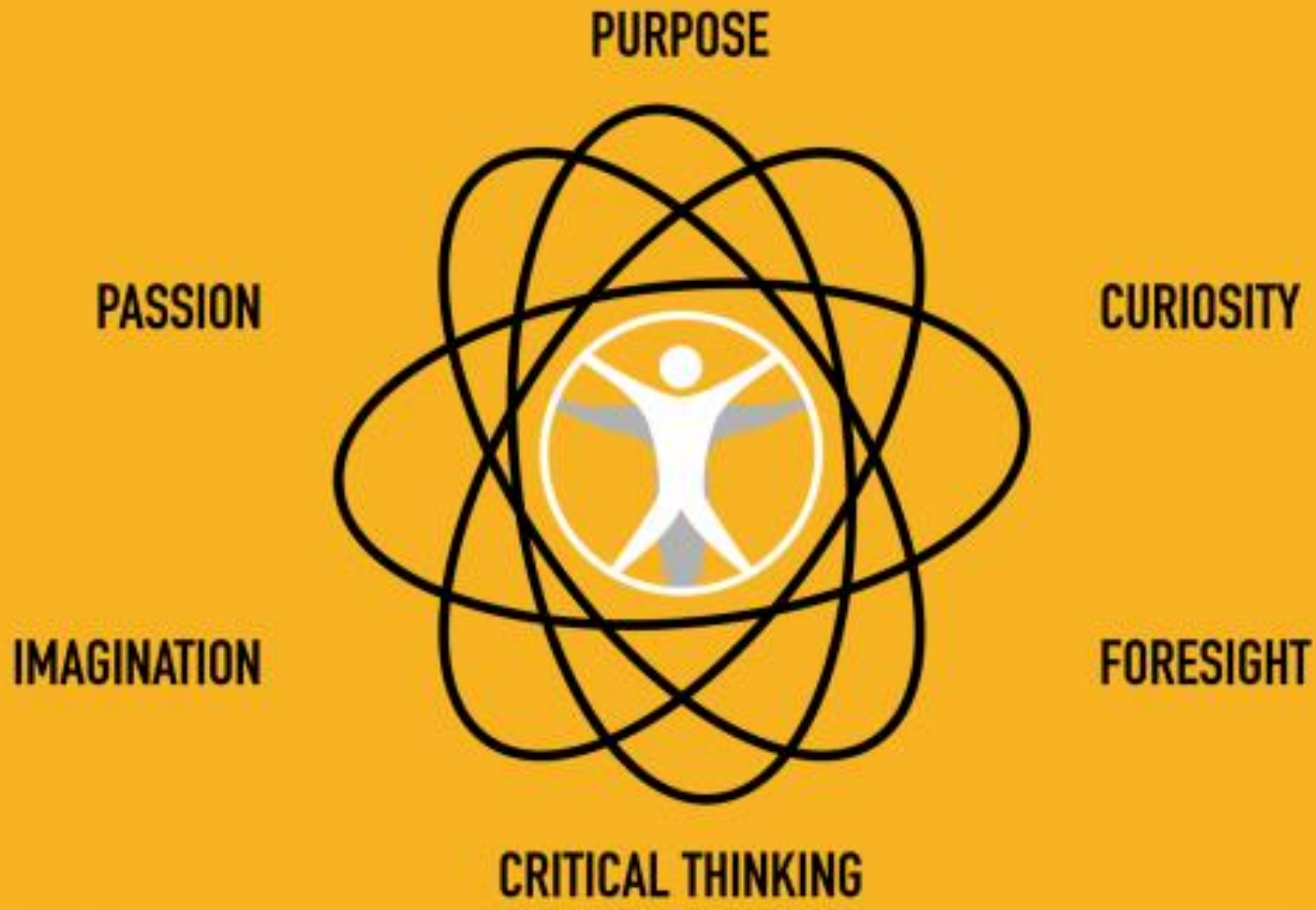
The Path

Digitalization

Till yesterday we were acting like hard working Painters!

Customer happiness is not an algorithm*

Human Assets



«Θέλουμε να αξιοποιήσουμε στο μέγιστο βαθμό τις δυνατότητες της τεχνολογίας και ταυτόχρονα να αναβαθμίσουμε τους ανθρώπους μας στο να αξιοποιούν στο μέγιστο βαθμό τις δυνατότητες του μυαλού τους, στις περιοχές που οι υπολογιστές αδυνατούν να τους συναγωνιστούν»

Nikolaos Skiathitis

Executive Director

Network Intelligent Operations & CEM Fixed & Mobile

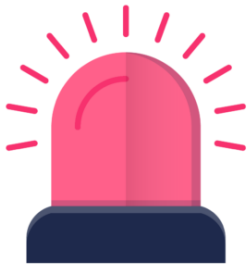
COSMOTE

The Challenge!

Millions of Subscribers to ensure supreme User Experience

In House Implementations:

- CSI Cell (Customer Satisfaction Indicator)
- CuBE (Customer Broadband Experience)



Thousands of Network Alarms
to handle, investigate & Prioritize.

In House Implementations:

- Virtual operator
- MUsE
- Diligent

Thousands of Network Performance KPIs to evaluate

In House Implementations:

- Visit
- Network Perforance Analyzer
- QPM Live

Thousands of Network Equipment to ensure their stable operation

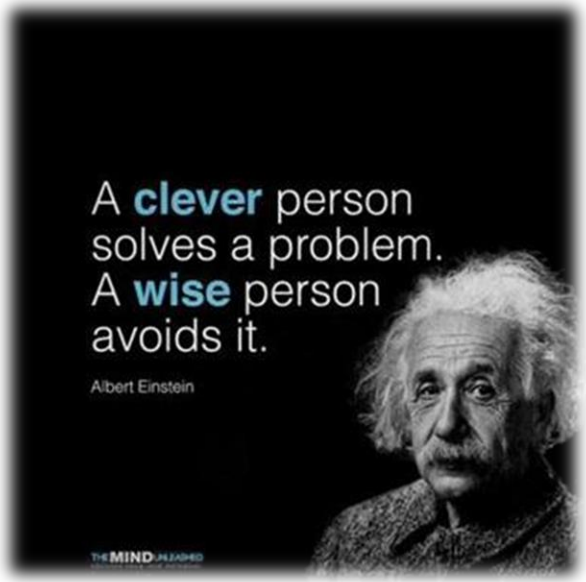
In House Implementations:

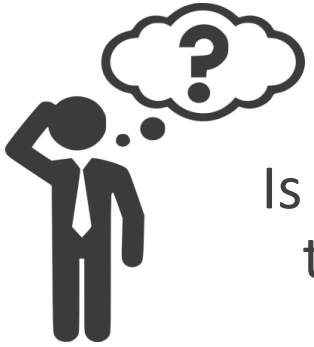
- **Predictive Maintenance**
- **Custom Voice Assistance (Ellie)**
- WFM

Predictive Maintenance

Temperature Issues Prediction Module

The Concept





Is there any way to **predict** potential hardware issues related to node's environmental conditions and fix them before any of our **customer's network experience** is affected?

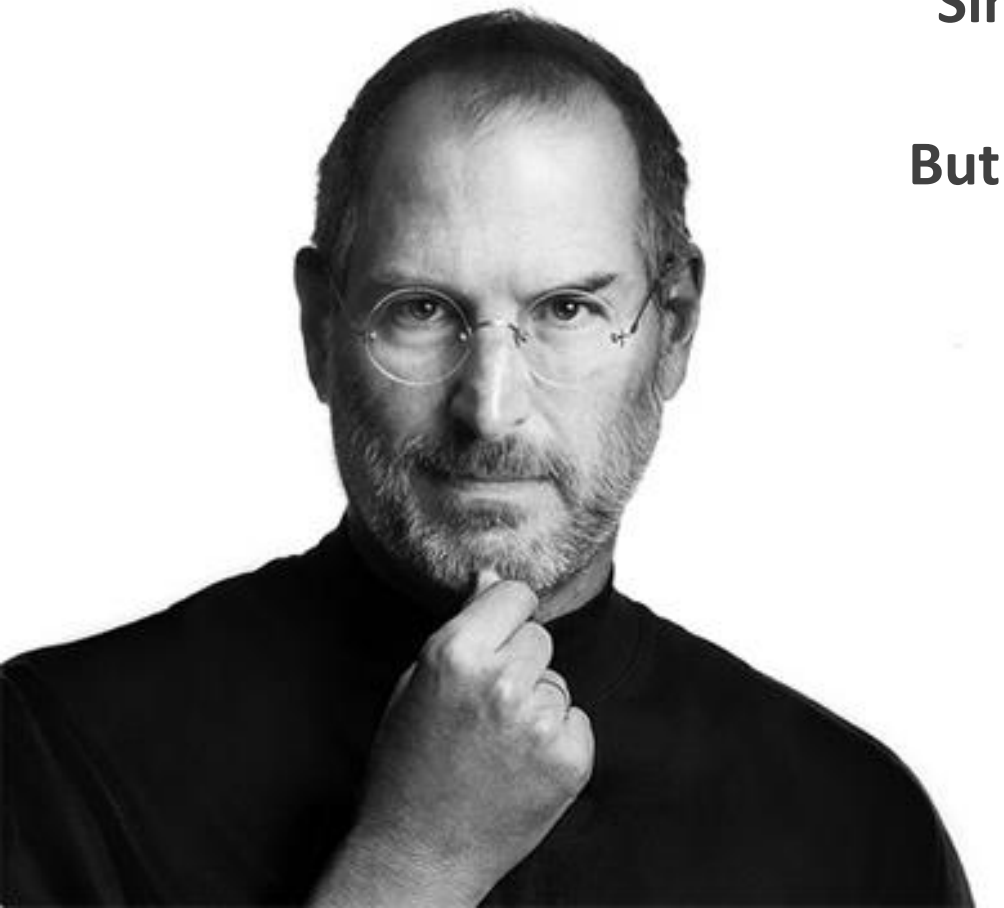
Maintenance Pillars

Reactive Maintenance

Proactive Maintenance

Preventive Maintenance

Predictive Maintenance

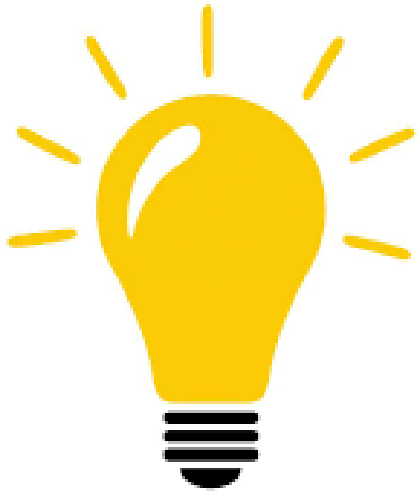


“Simple can be harder than complex: You have to work hard to get your thinking clean to make it simple.

But it's worth it in the end because once you get there, you can move mountains”

Steve Jobs

How ?

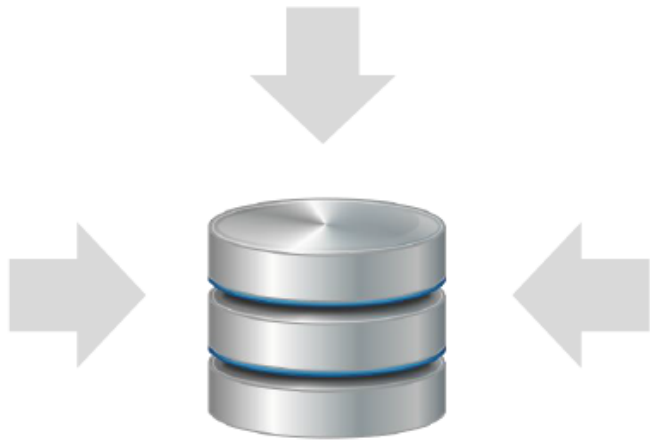


- The “Virtual IOT” Solution

Data sources

Trouble Ticket data

Cabin Temp
Data (Onboard Sensors)



External Weather
Conditions
(OpenWeatherMap.org)

K-Means Clustering

Cosmote NGA Dslam Prediction Model

NGA Dslam Per Vendor Clustering Analysis | NGA Dslam Time Period Network Deviation Clustering Analysis | NGA Dslam Temperature Time Period Network Clustering Analysis

NGA Dslam Temperature Clustering Analysis

Select Vendor

Huawei

Select Dates

2018-08-03 to 2019-10-07

External Temperature Range

0 100

0 10 20 30 40 50 60 70 80 90 100

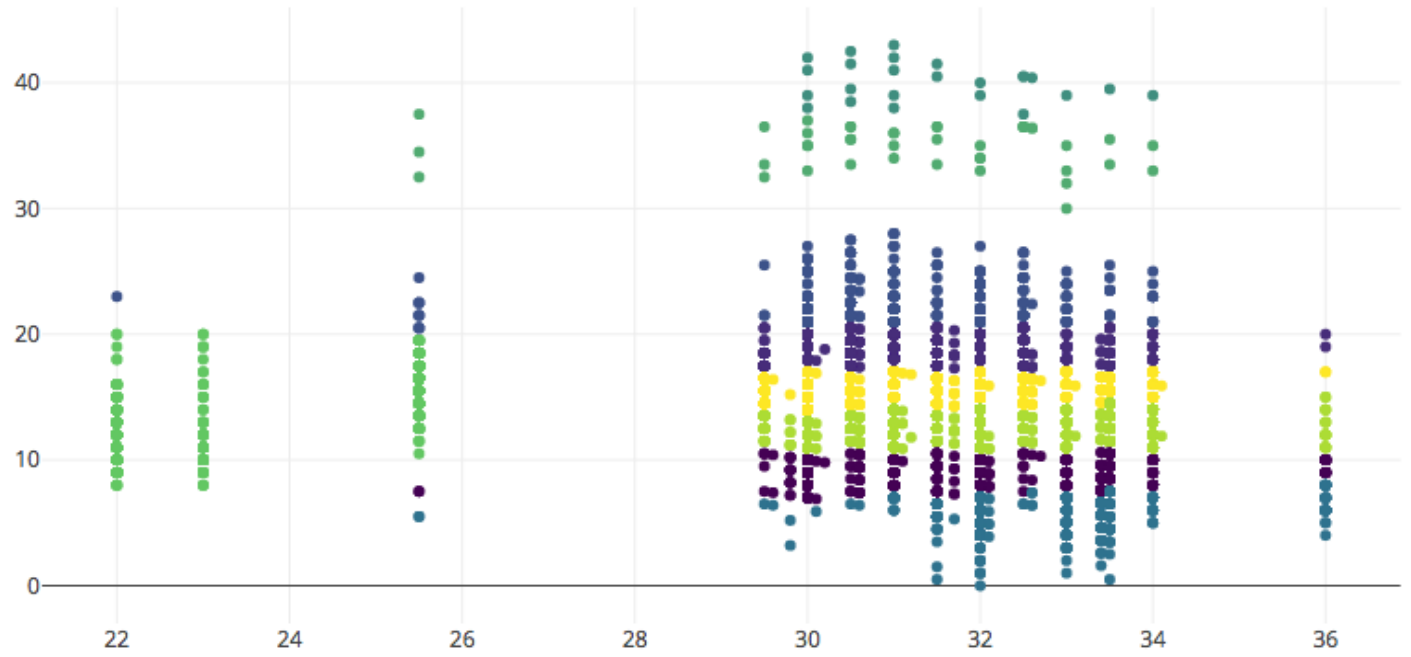
Dslam Temperature Deviation Range

0 100

0 10 20 30 40 50 60 70 80 90 100

Cluster count

9



Show 5 **entries**

Search:

Process Architecture

Network
Elements

Data Warehouse
Big Data

Trouble
Ticket

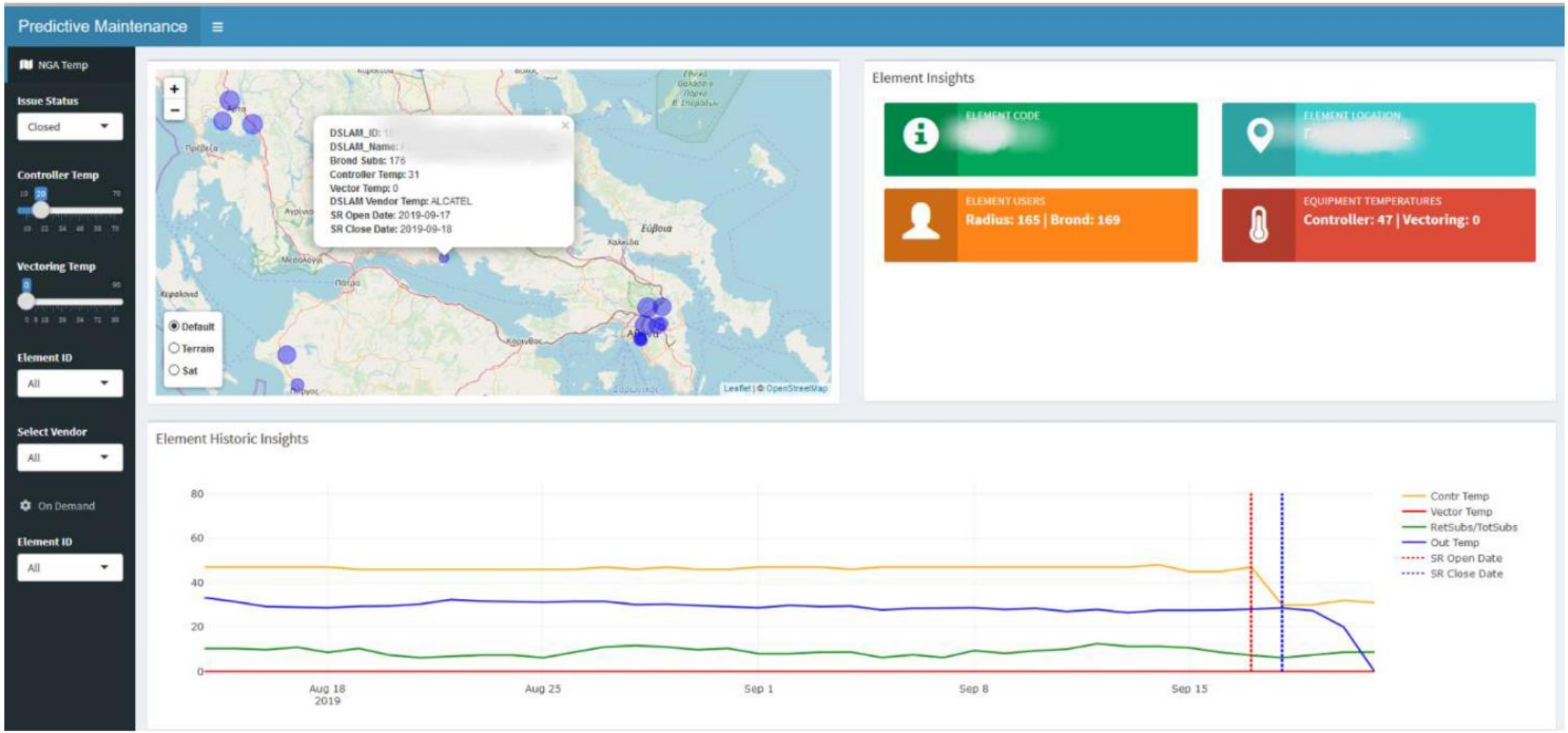
Network Server
Data Collection

cloudera

Data Science
Workbench

Web Interface

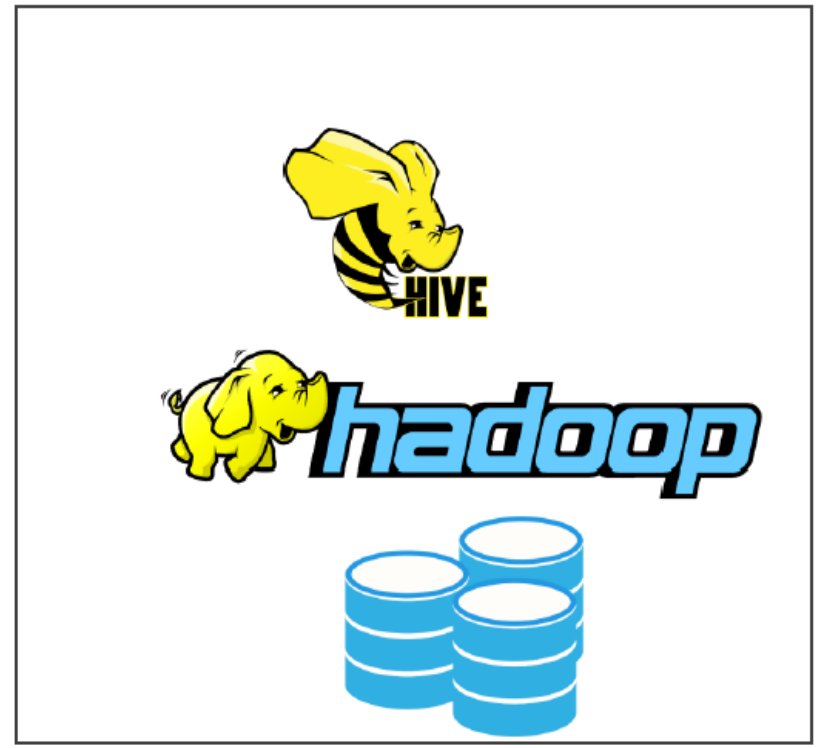
The Web Interface



The Tools

Shiny
dplyr
sparklyr
R
plotly
PROPHET

cloudera

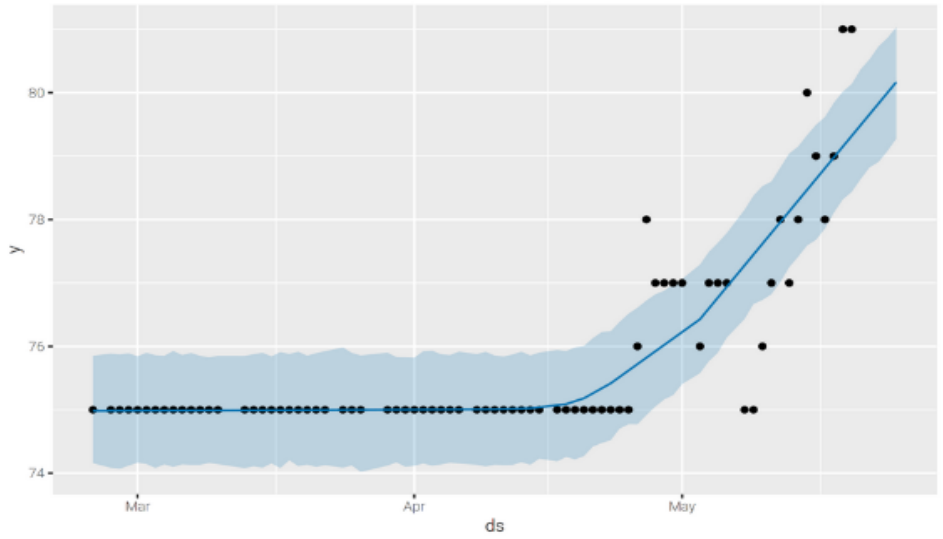

HIVE
hadoop

Real – World Temp Issue Examples

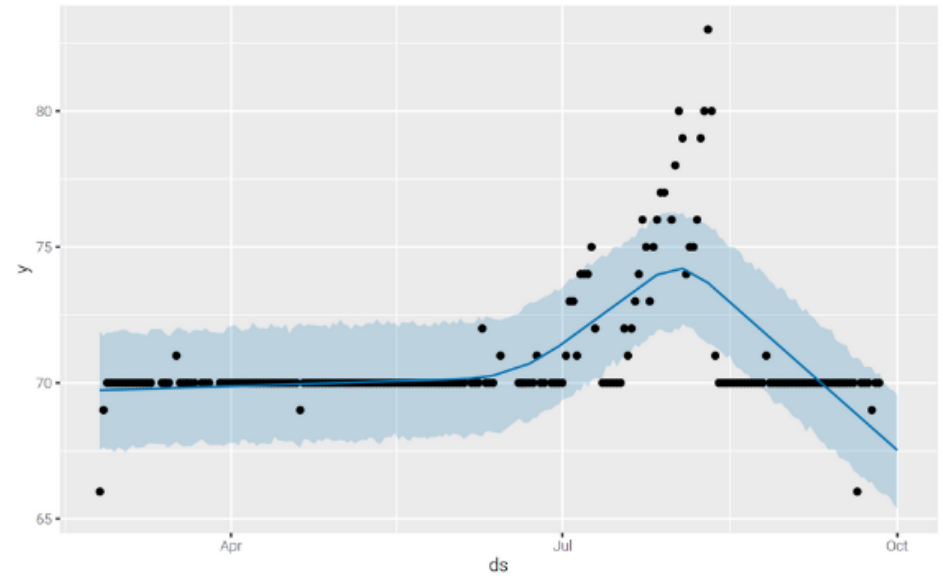
Dust and dirt due to equipment physical location

Time Series Forecasting charts

The Trend



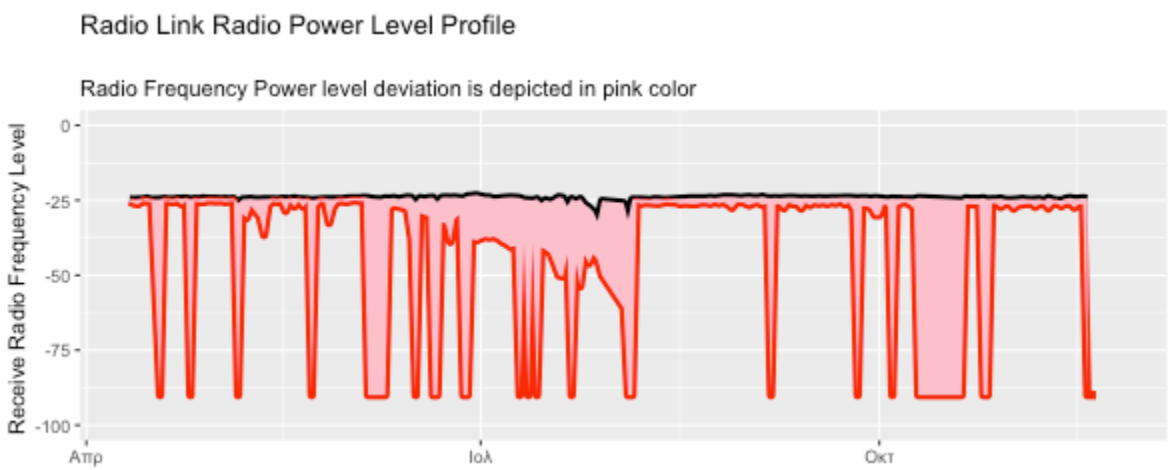
The fix!

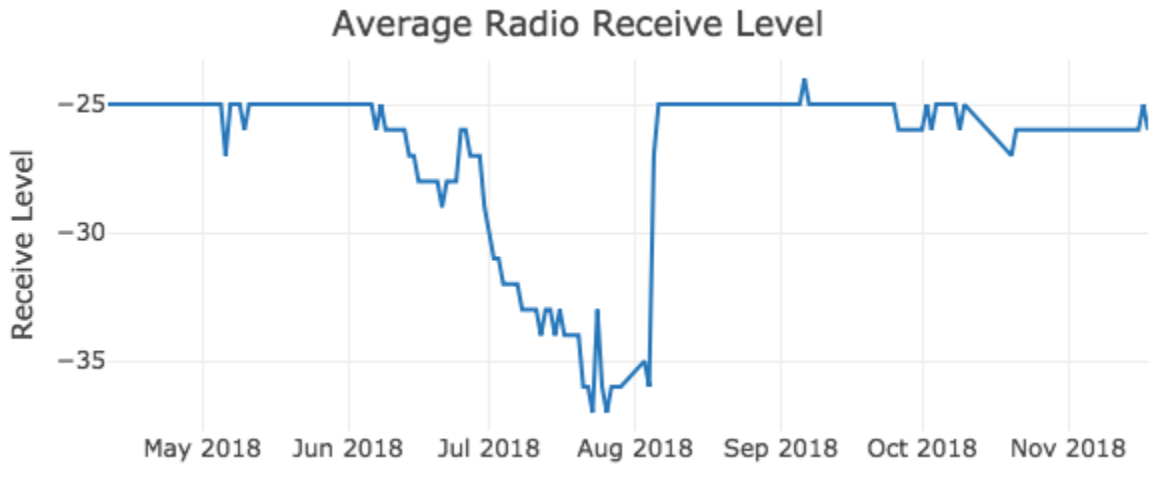


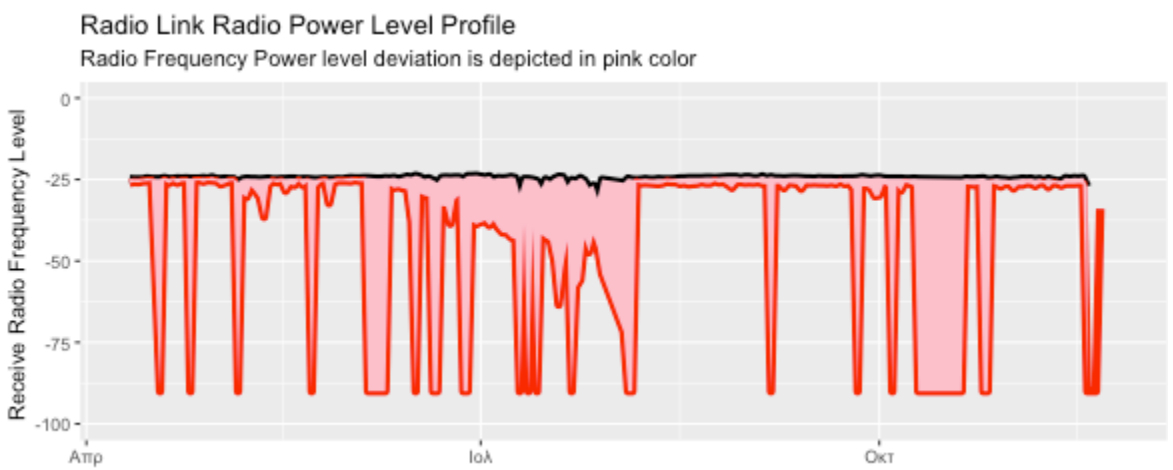
A Radio Link Story ..

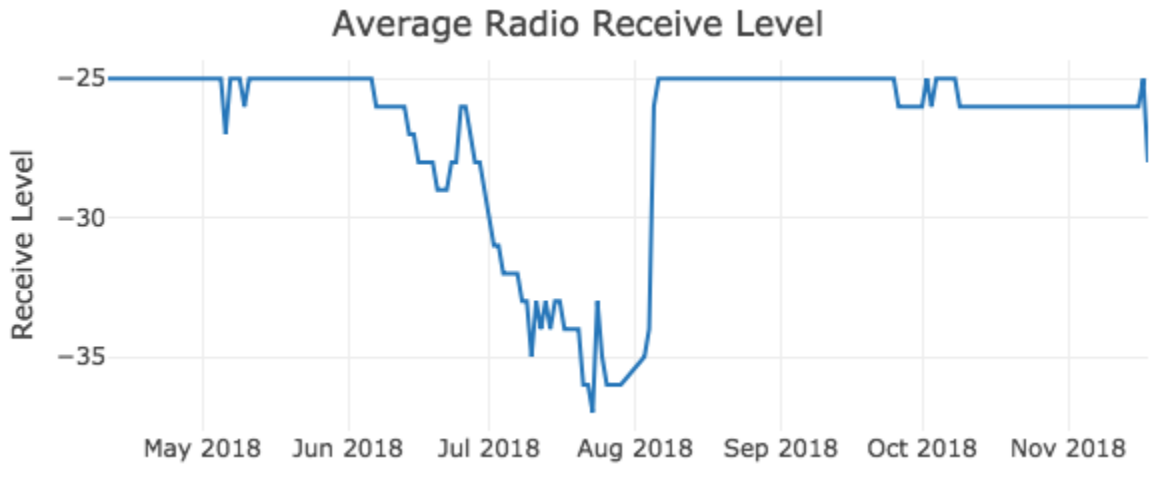
Customer Experience Center (Thessaloniki)

The Radio Reception History









A Radio Link Story ..

… With A Happy Ending!

Our data have **Voice!**

Modern Popular Voice Assistants

Smartphone-Based Voice Assistants

Apple Siri

First mainstream voice assistant

Default wake word
Hey Siri

Common tasks
Send messages, set reminders, create calendar entries, dial calls, answer questions, set timers, show weather forecast, take photos, set alarms, play music, send texts, open apps

Google Assistant

Debuted May 2012 as Google Now in Android 4.1 aka Jelly Bean, Google Assistant debuted in 2016

Default wake word
OK Google

Common tasks
Send messages, set reminders, create calendar entries, dial calls, answer questions, set timers, show weather forecast, open apps, set alarms, play music, send texts

Smart Speaker-Based Voice Assistants

Amazon Alexa

Debuted in November 2014 in Amazon Echo and Amazon Echo Dot smart speakers

Default wake word
Alexa

Common tasks
Makes calls, music playback, sets alarms, answers questions, provides real-time information, controls smart devices using home automation systems, uses Skills apps to do more advanced features

Google Home

Debuted in November 2016

Default wake word
Hey Google

Common tasks
Answers questions, plays music, controls smart devices using home automation, makes calls, sets reminders, reads news, works with Chromecast to stream entertainment

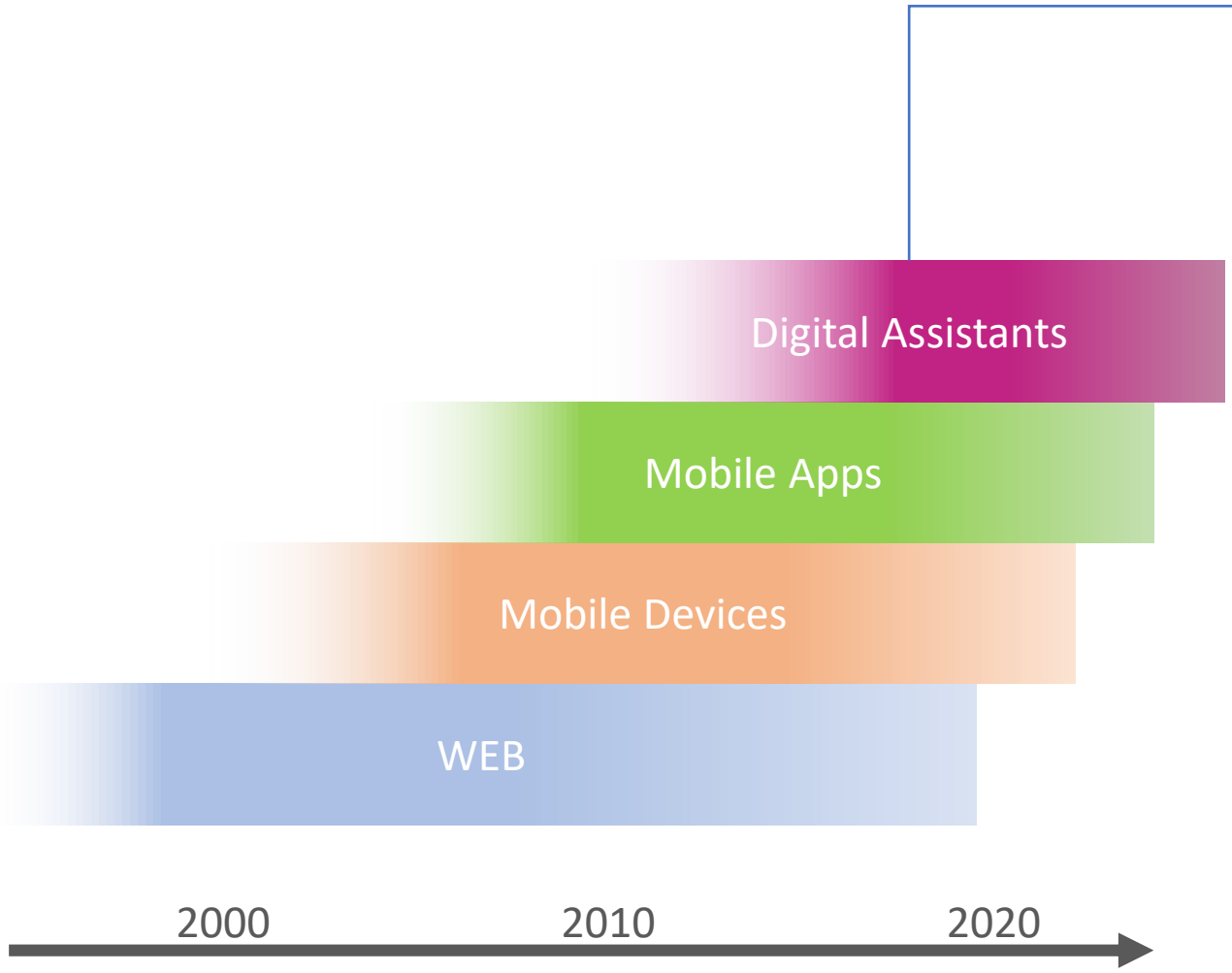
Apple HomePod

Debuted February 2018

Default wake word
Hey Siri

Common tasks
Plays music, controls devices using smart home automation, sets timers, reads news and information, creates lists, sends messages, makes calls on an iPhone.

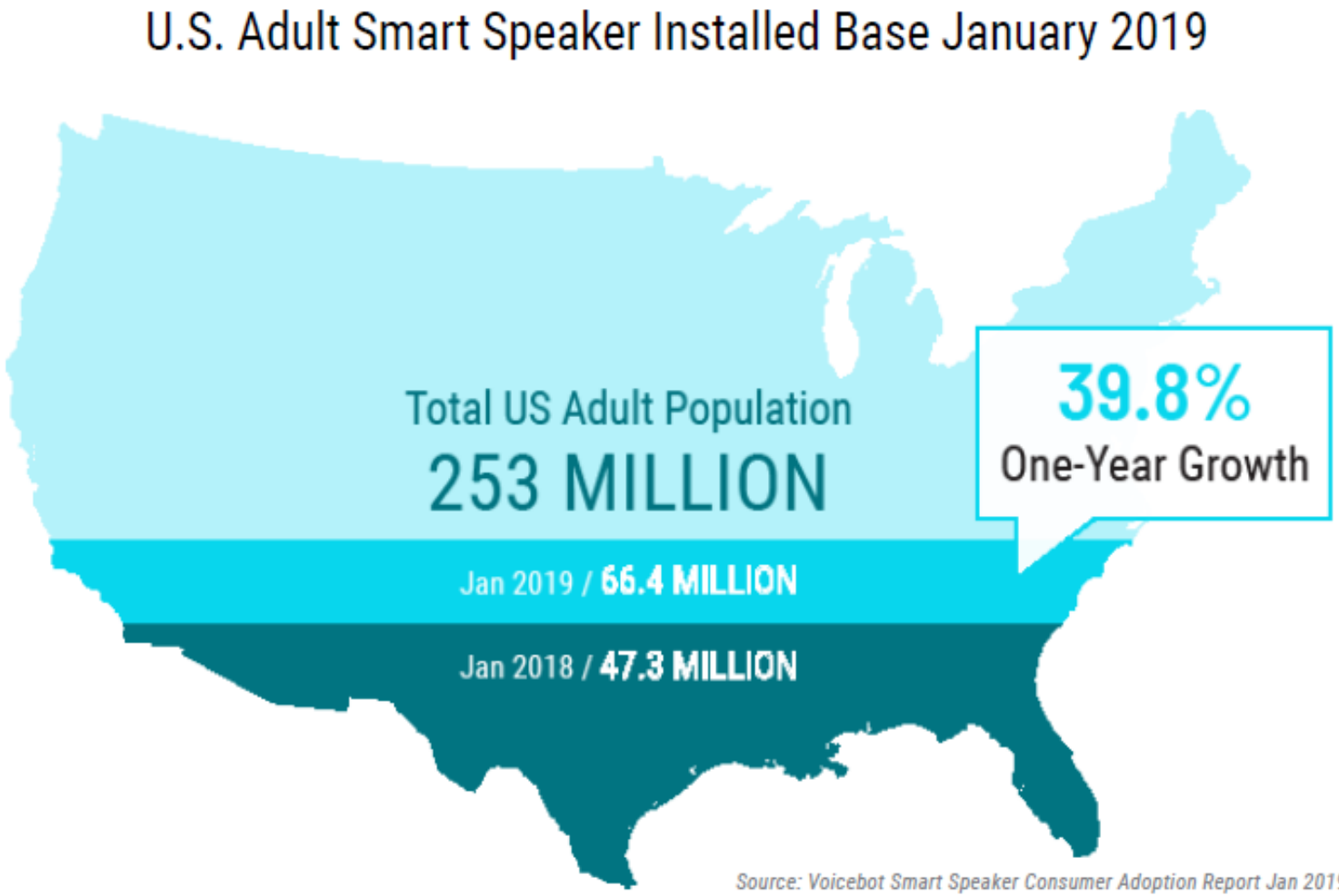
The History

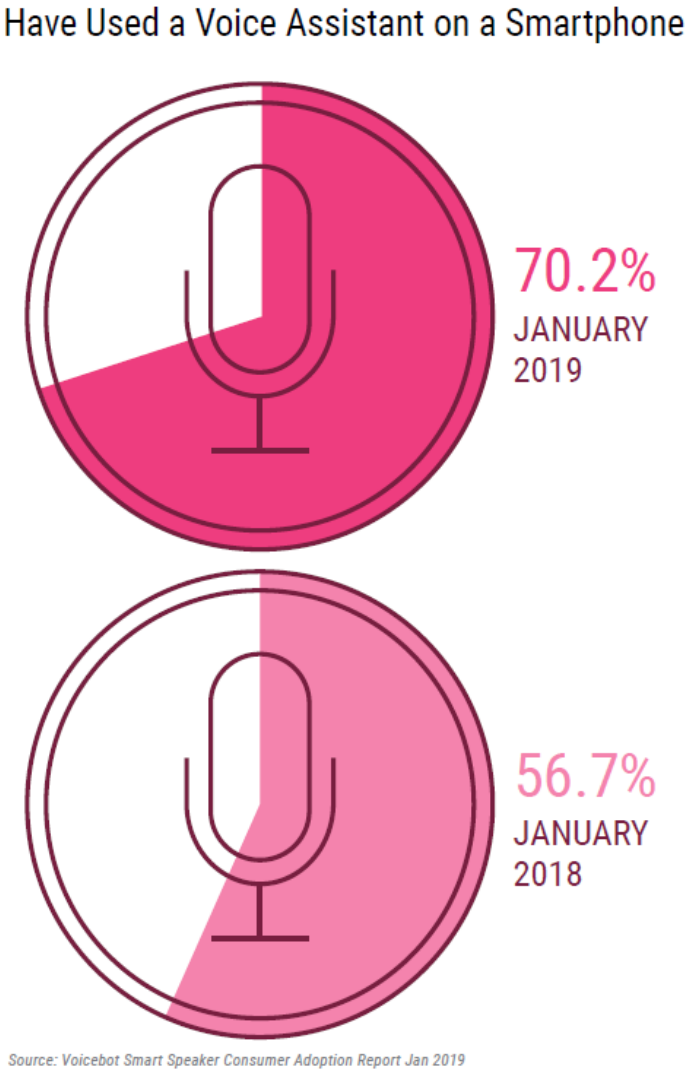


Timeline of Mainstream Voice Assistants

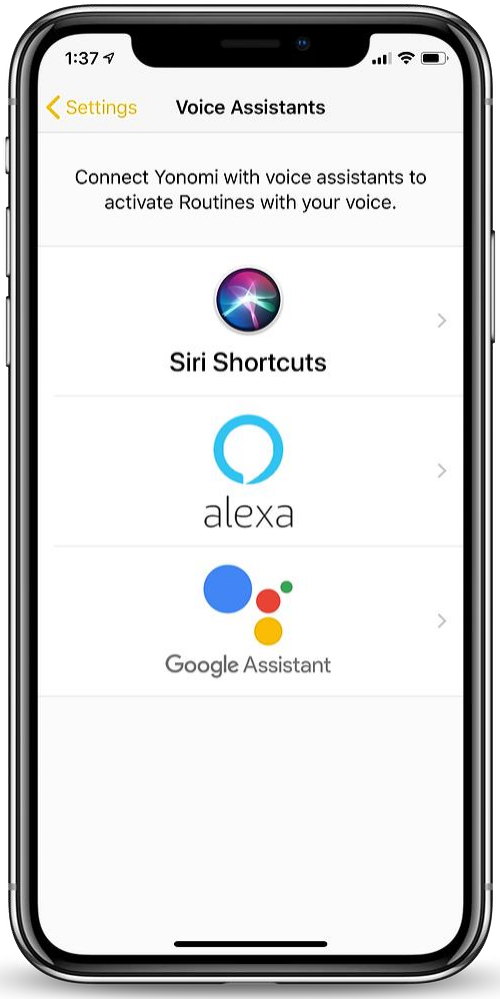
- **Apple Siri** — OCTOBER 2011
- **Google Now** — MAY 2012
- **Microsoft Cortana** — APRIL 2014
- **Amazon Alexa** — NOVEMBER 2014
- **Google Assistant** — NOVEMBER 2016

Stats


U.S. Adult Smart Speaker Installed Base January 2019
Total US Adult Population
253 MILLION
39.8%
One-Year Growth
Jan 2019 / 66.4 MILLION
Jan 2018 / 47.3 MILLION
Source: Voicebot Smart Speaker Consumer Adoption Report Jan 2019


Have Used a Voice Assistant on a Smartphone
70.2%
JANUARY
2019
56.7%
JANUARY
2018
Source: Voicebot Smart Speaker Consumer Adoption Report Jan 2019

Pros & Cons



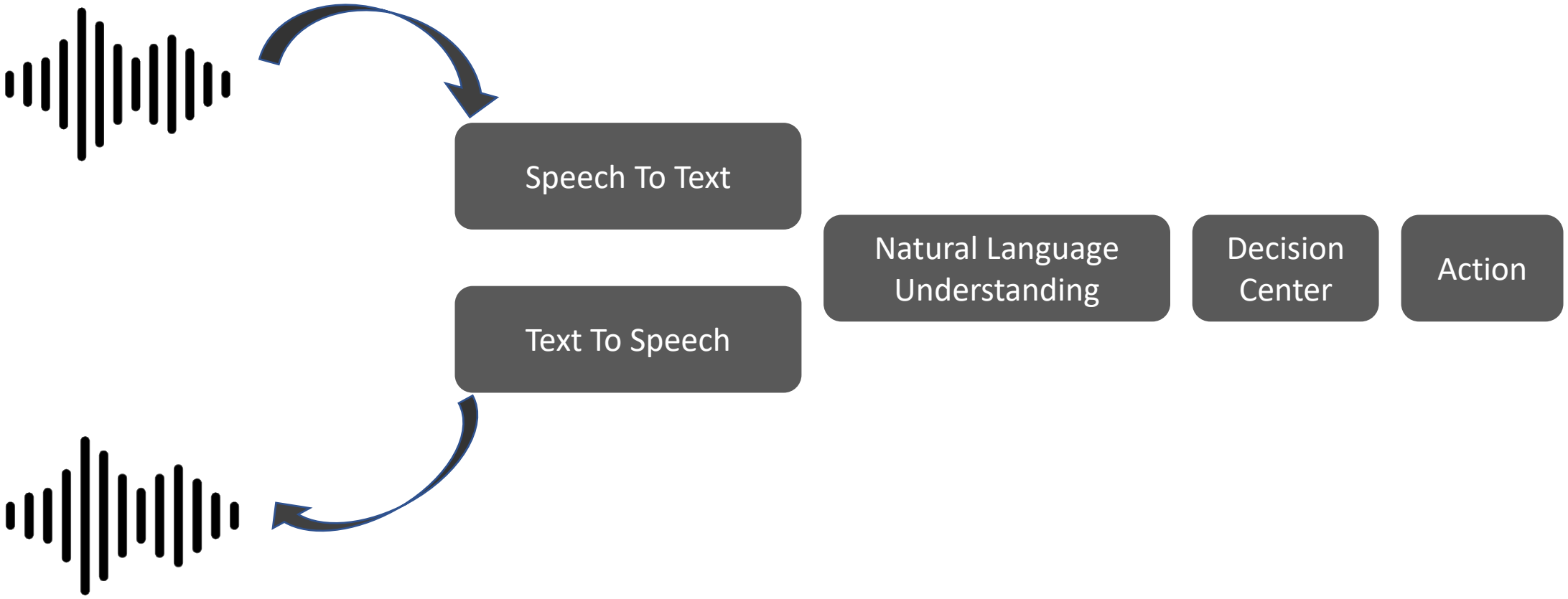
\+

Always On
Hands Free
Quick Content Access

\–

Not quite so smart yet…
(or are they?)

Core Architecture



Gains

Efficiency

- Increase Production
- Reduce Queuing

Simplicity

- Easy to use
- Supports Mobility of the user
- 7/24

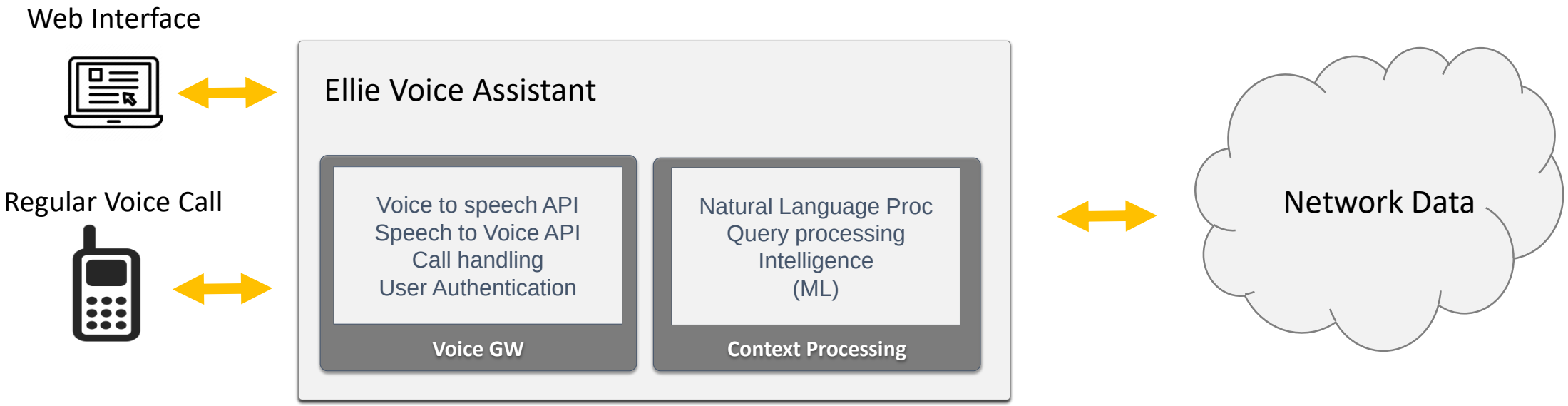
Security

- Mobile User Authentication
- Privacy
- Big Data Security

Time Efficiency

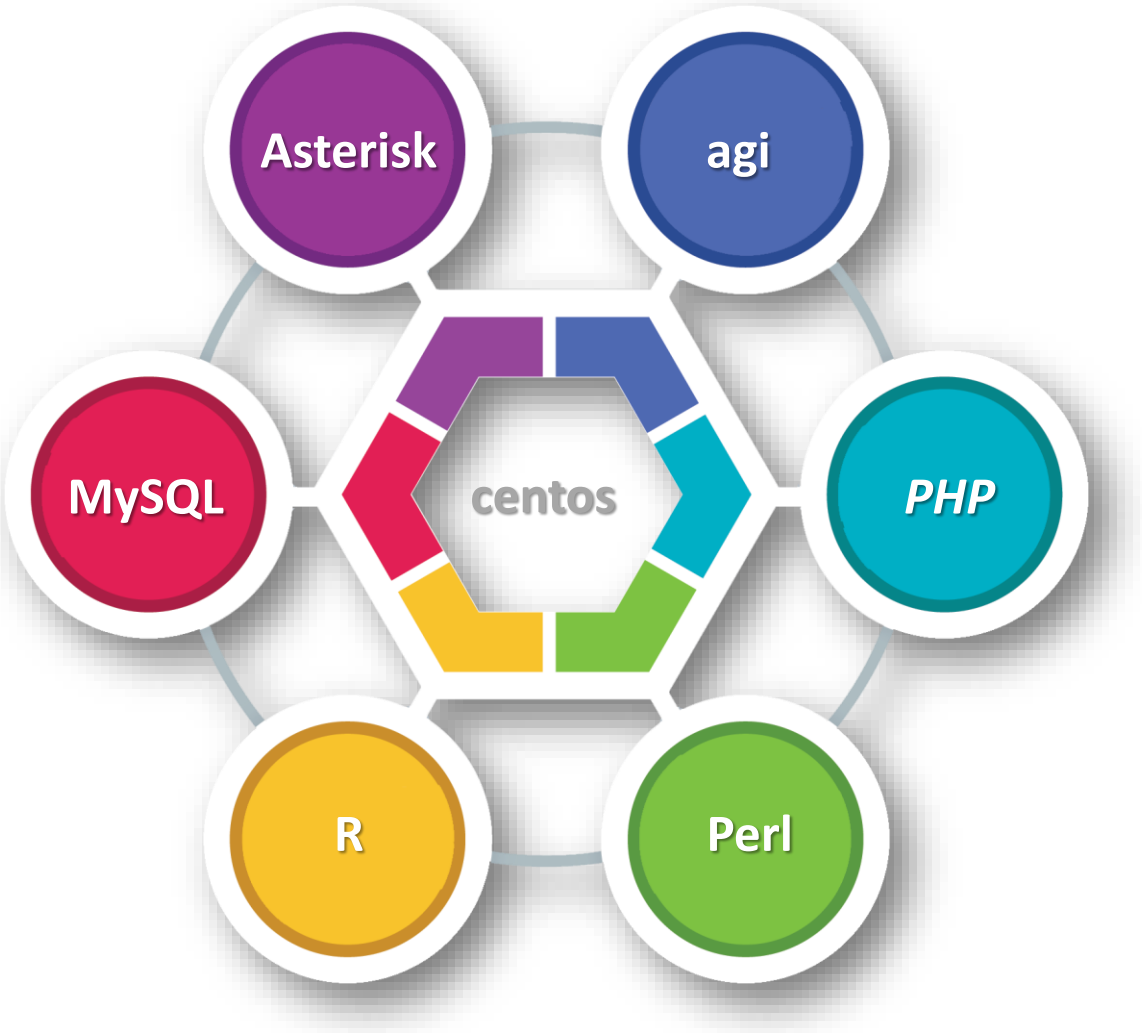
Fast prototype delivery
with use case

The System End to End



Use Case: Rigger

Tools



Now its time to meet..

Ellie

Transformation can be painful & difficult but is the only means to evolve and grow into a beautiful butterfly!