



# Incelligent

Machine learning – powered Networks

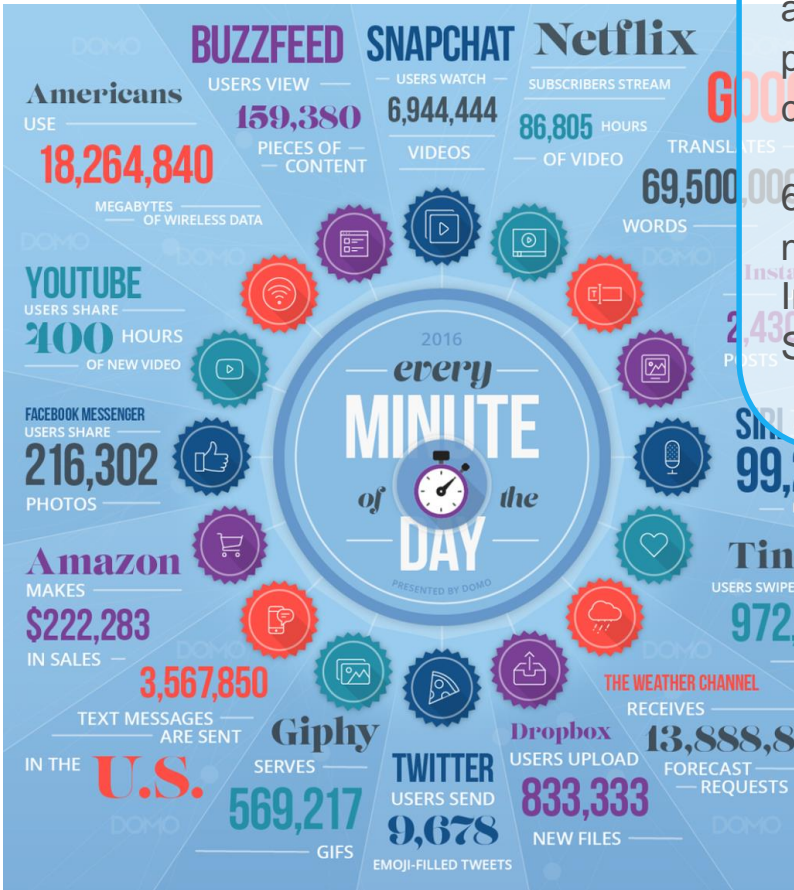
## Company Presentation

Q3 2016

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# Motivation



69% of companies looking for solutions in Big Data advanced analytics / predictive analytics cross domain

Big Data

68% of companies need a stated Business Intelligence / Analytics Strategy

Advanced User Experience Management

Proactive Maintenance

By utilizing Analytics & Predictive Models, MNO's can expect to see a 12%-25% reduction in churn and up to 40% increase in ARPU

Predictive Management

Customer Retention & Experience

68% of MNO's view Customer Experience as their #1 Strategic Priority

Cost of retaining a customer = 1X, Cost of acquiring a new customer = 5 ~ 10X, Cost of winning back lost customer = 50 ~ 100X

Incelligent

# Target customers and positioning

## Target Customers

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- Network operators (Mobile/WiFi/Fixed)
- Vendors of network equipment and management solutions
- Airports, Train stations, Smart cities, Exhibition centers, Conference centers, Malls, Shipping, ...

## Positioning:

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- Advanced Customer Management
- Added – value services on Big Data
- Smarter/automated network management, OPEX reductions
- Complementary to SON
- Enabler for IoT / IoE
- Quality and efficiency for smart cities and other Hotspots

# Scope of Addressable Challenges

## 1 Efficient Network

- Resource Management
- Service Management
- Fault Management
- Network Energy Saving
- Network Planning
- Threat Detect/Prevent
- Fraud Management
- Field / Workforce mngt.

## 2 NG Customer Operations

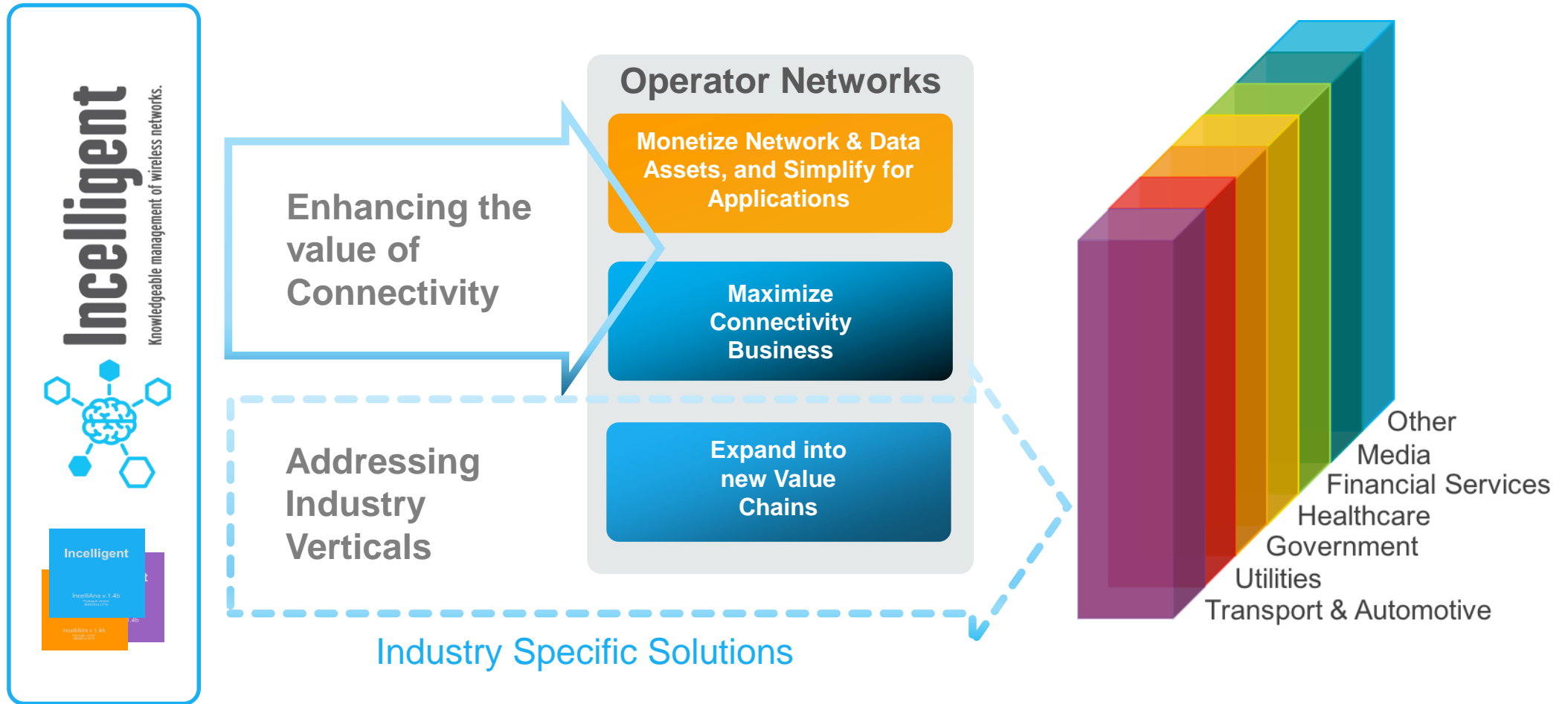
- Churn/Retention Mngt
- Personalized QoS
- Proactive Customer Interactions
- BP Optimization
- Personalized Offers Mngt.
- Campaign Impact Prediction

## 3 New /NG Services

- Smart City / IoT Applications
- Footfall Predictions
- Mobility Pattern Analytics
- Predictive Logistics
- Hetnet Management
- Emergency Support

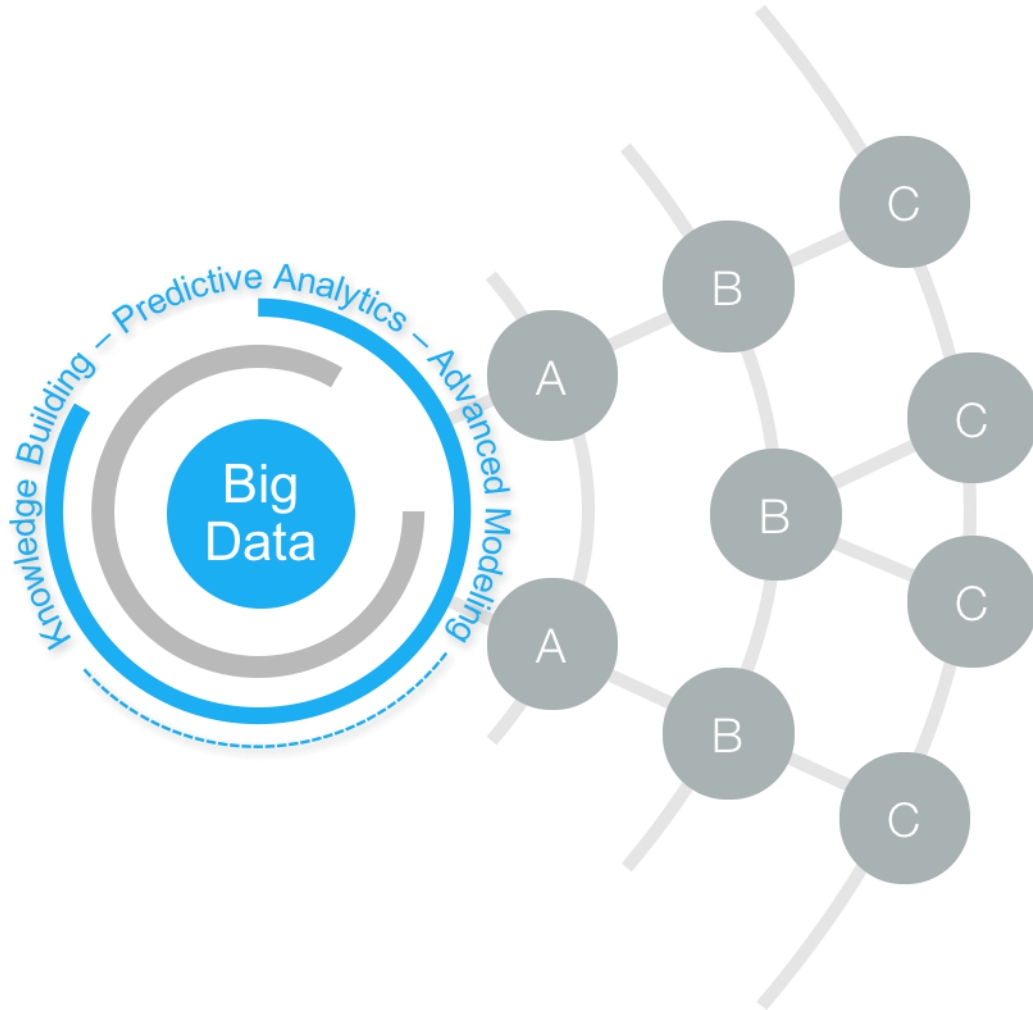
# Incelligent's Framework

Addressing Needs from different Industries



# Quick intro of our software platform

# Incelligent Platform in one sentence



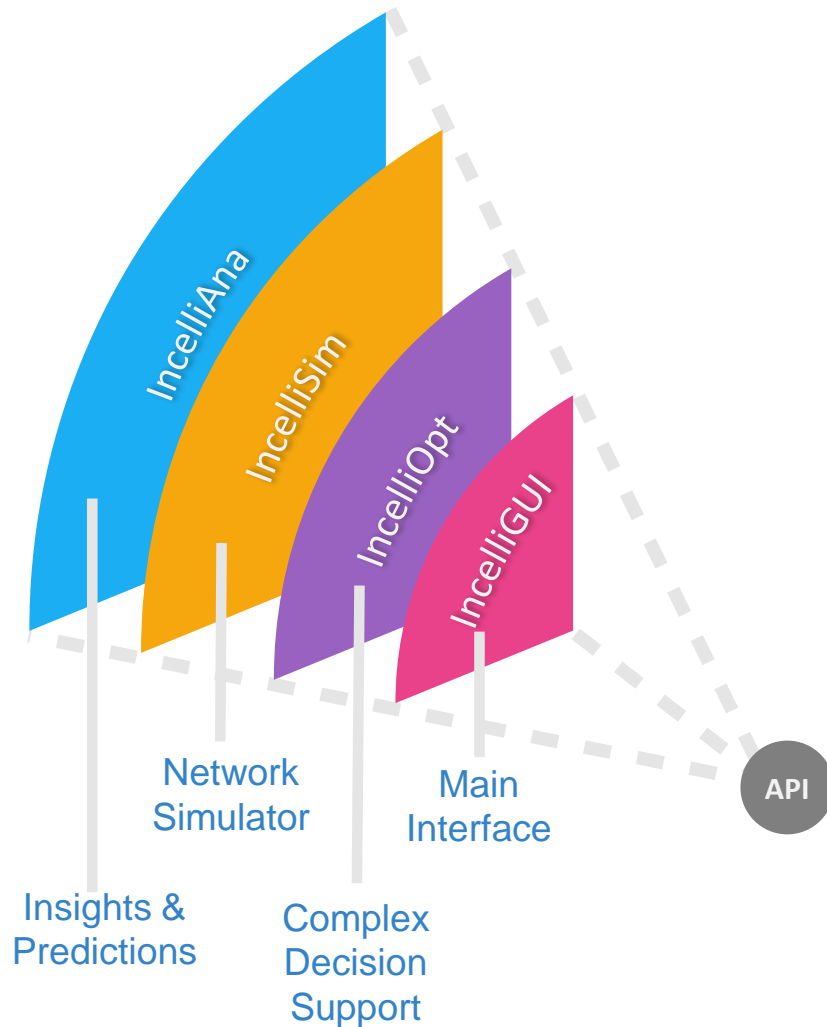
**Incelligent** processes Network and non – Network **Big Data** with advanced **Machine Learning** algorithms producing unparalleled levels of:

- Customer Retention** & **User Experience**,
- Optimization of Resource Use**,
- Monetization** of **Big Data** and the **IoT** revolution.



# Incelligent Software Components

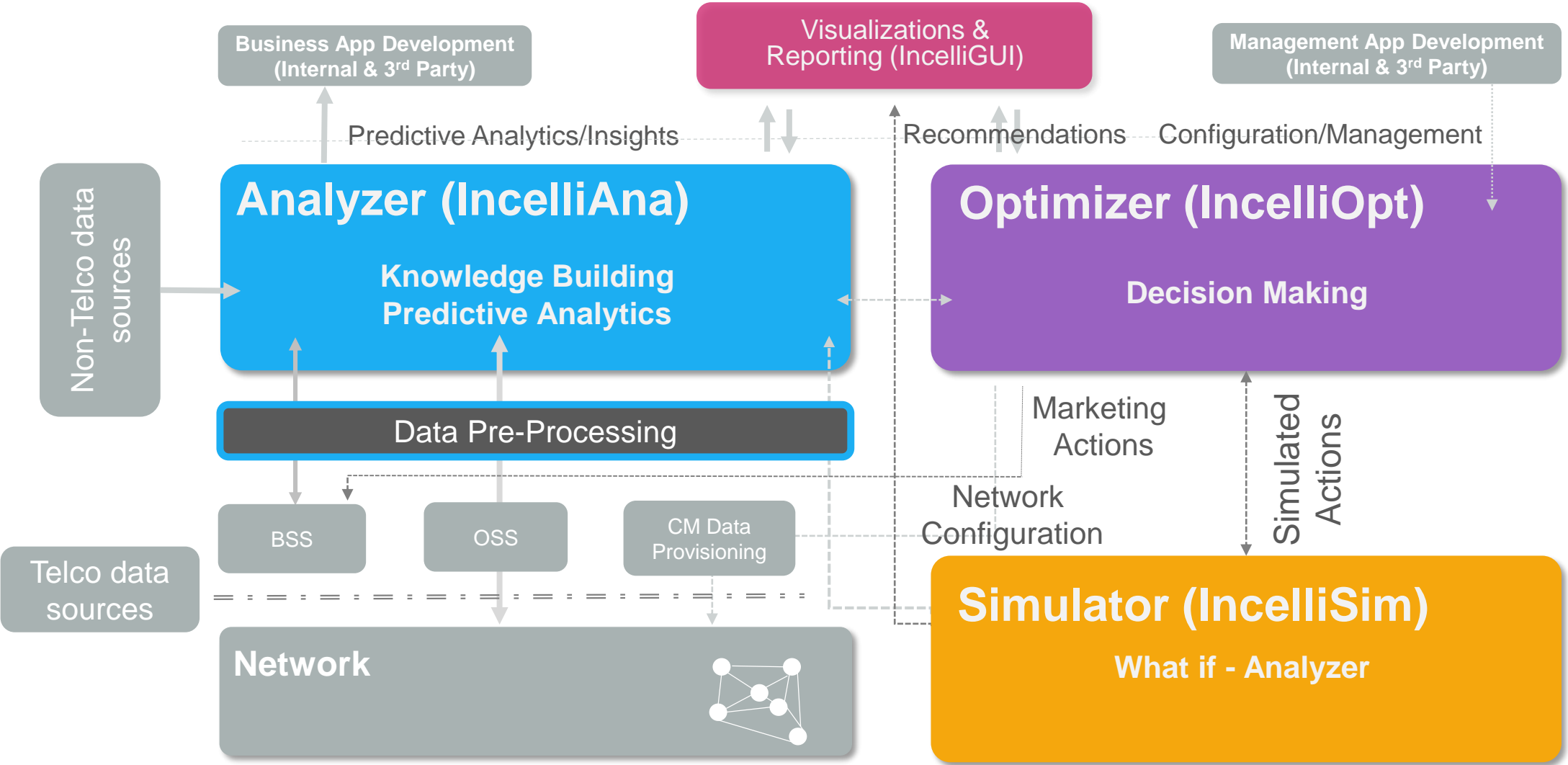
(standalone products)



- IncelliAna**  
Accurate predictions from seemingly uncorrelated, highly heterogeneous data (network & non-network)
- IncelliSim**  
What – If Analyzer  
Evaluating your Investment, Management and Technical options
- IncelliOpt**  
Optimizing Service Quality, Network performance, Customer experience, Revenue and OPEX
- IncelliGUI**  
Unified GUI for Incelligent components allowing for an outstanding user experience and ease of control
- API**  
Business / Management / App Development open to 3<sup>rd</sup> parties



# Incelligent Platform – Combined Intelligence



# Innovations & Benefits



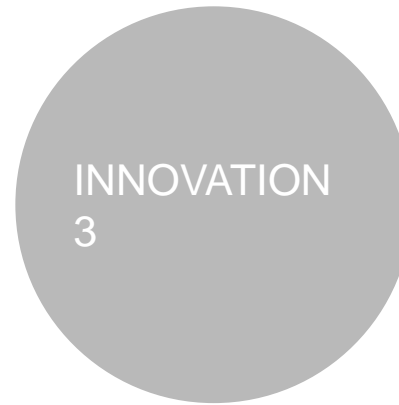
## Advanced Machine Learning

Deep Neural Networks  
Predictions in time and  
space



## Heterogeneous Data Input

Non-Telco Data  
(weather, Date, Events in  
area, Social Nets, IoT, etc.,)  
Marketing Activities  
Telco Data  
(Network KPIs/KQIs.  
Network Topology.  
BSS/OSS Data, Subscriber  
QoE)



## Multi – X Support by Design

Multi-Vendor  
Multi-Technology  
Multi-Tenancy  
@zero-time & cost for  
organization



New Smart Services & Big  
Data Monetization  
Smart Customer Operations  
(CEM)  
Multi-Domain, Multi-  
Technology, Vendor  
Agnostic  
Smart & Efficient Network  
Management  
IoT Enabler

# Examples of use cases

# Use Cases

**1** **Improve QoS**

1. Where & when is my next congestion expected?  
→ At region 124, this afternoon ← **IncelliAna**

2. How can I optimize user experience?  
→ Steer car data traffic of region 124 to small cells between 17:15 and 17:45 ← **IncelliOpt**

**2** **Reduce OPEX**

1. Where & when will I consume unnecessary resources?  
→ At sectors of cluster #15, tomorrow noon ← **IncelliAna**

2. How can I reduce OPEX without affecting QoE?  
→ Deactivate secondary cells of #15 between 11H - 13H tomorrow ← **IncelliOpt**

**5** **Customer Retention**

1. What is the impact of my planned promotion to current high value customers?  
→ 10K subscribers predicted to experience significant degradation ← **IncelliAna**

2. Which element(s) of my promotion need(s) to be optimized?  
→ Shift promotion by 3 hours earlier and reduce the provided data volume by 20% ← **IncelliOpt**

**3** **Evaluate Options**

1. How much can I save in OPEX using small cells in a region  
→ X% on energy, Y% on labor, with QoE impact at Z% ← **IncelliSim**

2. How would network cluster #52 perform using SON XYZ?  
→ +X% on energy, -Y% on QoE ← **IncelliSim**

**4** **Monetize Big Data**

1. How many subscribers of customer segment X are expected in areas Y tomorrow morning?  
→ 1000 persons, at a peak pace of 300 per hour ← **IncelliAna**

2. How does my store perform against my direct competitor?  
→ I achieve 30% more footfall from locals and 20% less from visitors ← **IncelliAna**

# Current Projects

# Spectrum Optimization

## *Pilot with Large MNO, part of Global group*

- Identified Milestones:
  - Phase 1:
    - Traffic / Spectrum Analytics
    - Evaluation of the impact of each refarming action to selected KPIs
  - Phase 2:
    - Predictive analytics of data traffic
    - Exploitation for finding best options regarding GSM band refarming.
- Data sources: Network & Marketing KPIs, External Events (non network)
- Components: IncelliAna, IncelliOpt, IncelliSim
- Areas of interest for collaboration after this project:
  - Predictive analytics for planning & optimization
  - Impact of imminent / scheduled 4G cell deployments to operating segments
  - Management of extra 5MHz / 10MHz channels
  - Evaluation and smart selection of SON options
- Timeframes:
  - Phase 1: Completed June 15 2016
  - Phase 2: Estimated time for completion Q3 2016

~85% prediction accuracy,  
50% faster decisions, resulting in  
TTM advantage

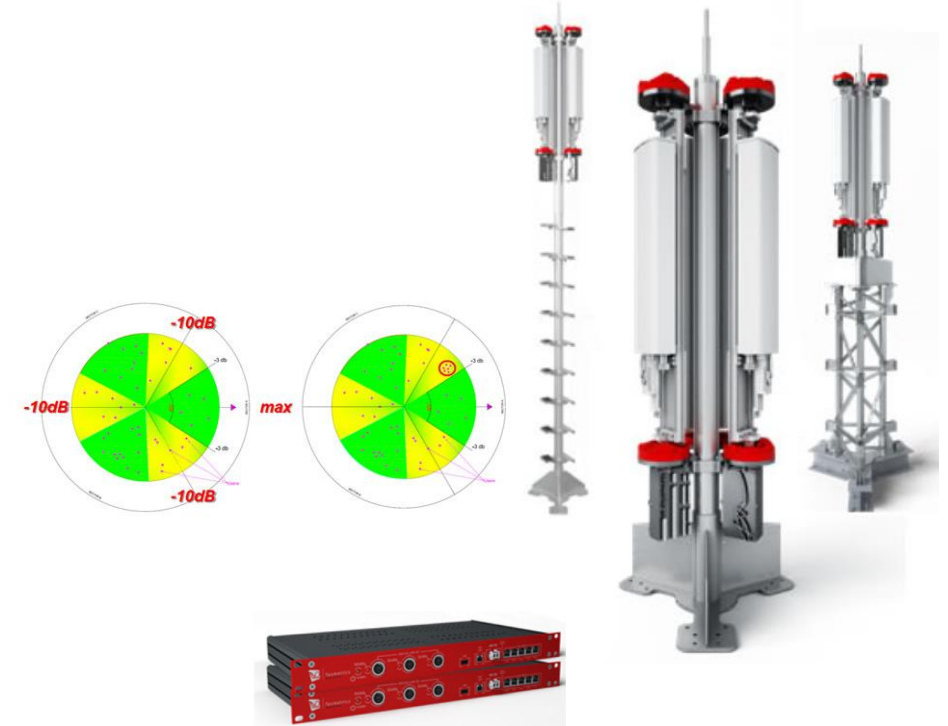


# Optimize Antenna Azimuth Project with Antenna Vendor

- Topics:
  - Analyzing radio performance at different transmission angles
  - Predicting optimal angle schedule per antenna
- Data sources: Network KPIs, Weather, Social media
- Components: IncelliAna, IncelliOpt
- Estimated completion: 2016 Q4
- Areas of interest for collaboration after this project:
  - Installations to mobile network operators
  - Maintenance & Support
  - Further evolution of platform
  - Vendor OEM reselling

≥30% gain in base station performance

Dynamic adjustment –  
Follow the traffic  
- Predict Optimized positioning



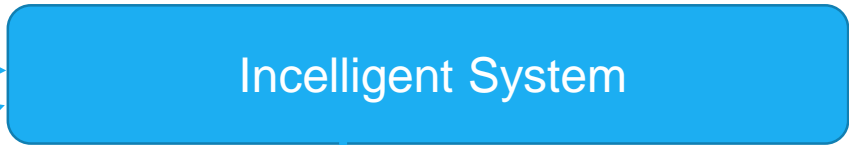


# Challenge Up



1b. Non-telco (external) data e.g. social media

1a. Telco data and non-telco (sensor) data



### 3. Output

- Commands to 3GPP-based macro and small cells and WiFi APs
- Traffic steering (at appropriate time/area)

### 2. Incelligent Functionality

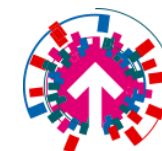
- **Predictions**
- Resource allocation and traffic steering
- Interworking with Cisco or other resource management mechanisms
- Running on Intel computing infrastructure
- Enforcing on DT wireless infrastructures

Market Addressed:  
Malls,  
Airports,  
Stadiums,  
etc.



### Extensions

- IoT-based actuation
- Retail domain (marketing, resource planning)



# Monetize Mobility and BSS data

## PoC with a strong MNO in Region Middle East

- Topics:
  - Big data monetization
  - Analytics and predictions of footfall and dominant mobility paths in Malls and other Commercial zones
- Data sources: Network, Demographics, Events, Social media
- Components: IncelliAna, IncelliSim
- Estimated completion: 2016 Q3
- Areas of interest for collaboration after this project:
  - Ongoing business development for all relevant zones of the country
  - Additional areas of big network data monetization



# Improve Net Promoters Score (NPS)

## *PoC with a Large MNO, part of global group*

- Topic:
  - Predictive identification of subscriber low quality of service incidents
  - Action: activate customer care
- Data sources: Network, Marketing, Weather, Social, etc.
- Components: IncelliAna, IncelliOpt, IncelliSim
- Estimated completion: 2016 Q2
- Areas of interest for collaboration after this project:
  - Predictive / Personalized QoS net analytics & management
  - Proactive evaluation of campaigns



# IoT, 5G Services and Network Management

## Topics:

Proof of Concept (PoC) architecture and platform, enabling enhanced IoT services to be delivered efficiently in a 5G environment through the use of a proactive management framework with monitoring, analysis, learning, predictions and configuration capabilities. The demo showcases the delivery of high quality IoT services through the real time performance monitoring and reconfiguration of the virtual Evolved Packet Core (vEPC) VNFs (e.g. PCRF, HSS, MME) and the IoT LoRa gateways in order to follow the requirements of the deployed IoT services (e.g. mix of MBB/MTC/MCC services, required level of reliability etc.).









## Research & Innovation Collaborations

- Big Data PPP:  Innovation engagement with Telecoms, Media, Banks, Utilities, etc.
- 5G PPP:  
- 5G Innovation Center: 
- POC Analyzed 3G data,  achieved 97,5% accuracy

## Close to Industry Standards

- ETSI – NTECH 
  - Expert services on Self-managed 3GPP networks (paid contract)
- IETF-IRTF  
  - Selected member of Network Machine Learning Research Group (NMLRG)
- FP7 EU project - Fed4FIRE 
  - Pilot on WiFi networks **FED4FIRE**
- H2020 - MONROE 
  - Experiments for Improving Quality of Experience in mobile broadband environments

# Strategic Partnerships

**SAP<sup>®</sup> startup.focus.**  
Member

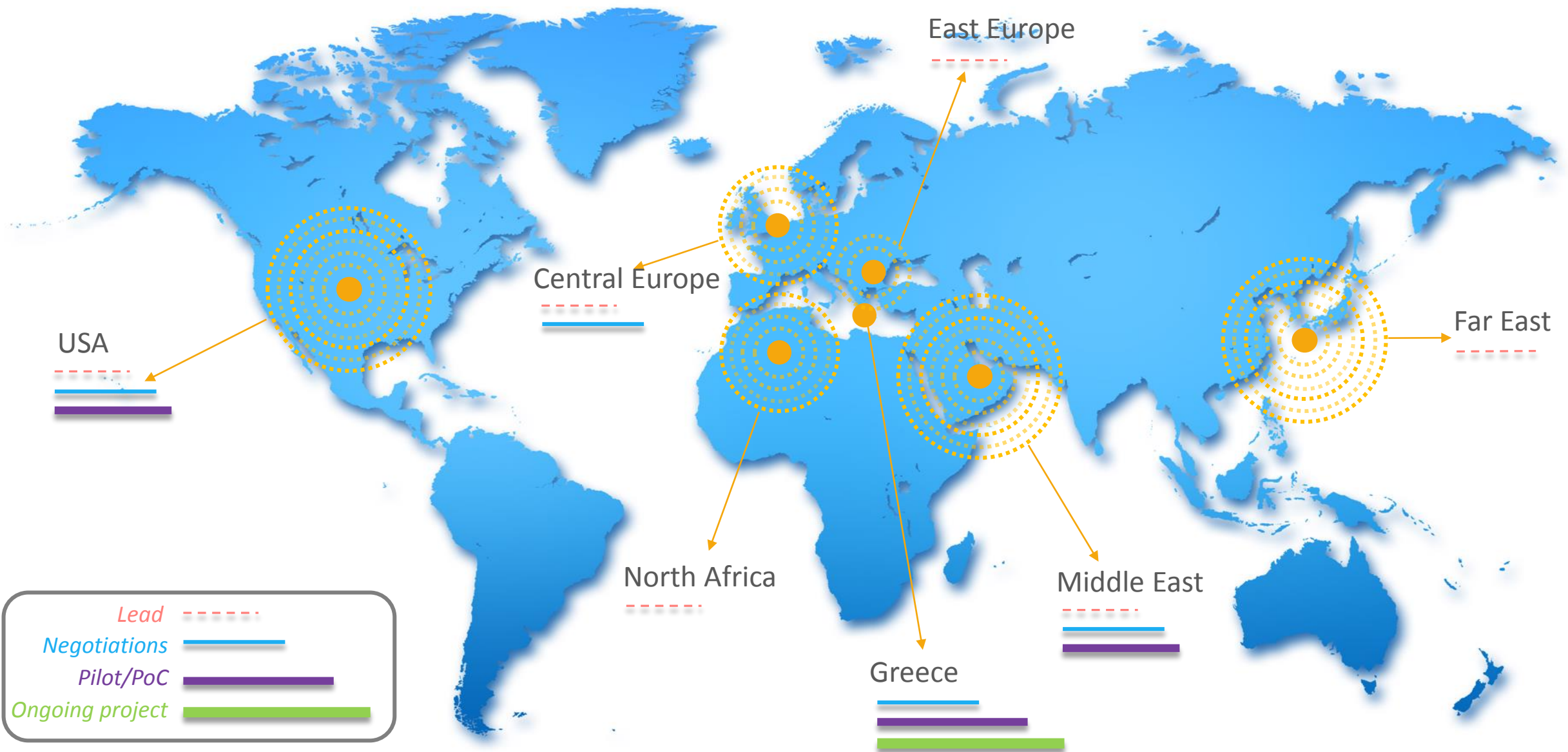
**ORACLE<sup>®</sup>** **Silver  
Partner**

**IBM**

# Geo Coverage



# Global Reach





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