



EMPIRIX

Transforming Raw Data to Profitable Intelligence in Mobile Networks

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Agenda

- Growth of Mobile Data
- Data Value Chain Contribution to Data Growth
- Signal from the Noise: Organizing Data Intelligently
- Mobile KPI Classes and Examples
- Intelligence Continuum and SOC KI Data Design
- Use Case: SOC and VoLTE Service Assurance

Mobile Data Is Growing

Global Mobile Data Traffic Growth / Top-Line

Global Mobile Data Traffic will Increase 12X from 2012 to 2017

Average Mobile User; Traffic per Month

Machine-to-Machine Mobile Data Traffic Growth

M2M Data Traffic will Increase 21X from 2012 to 2017

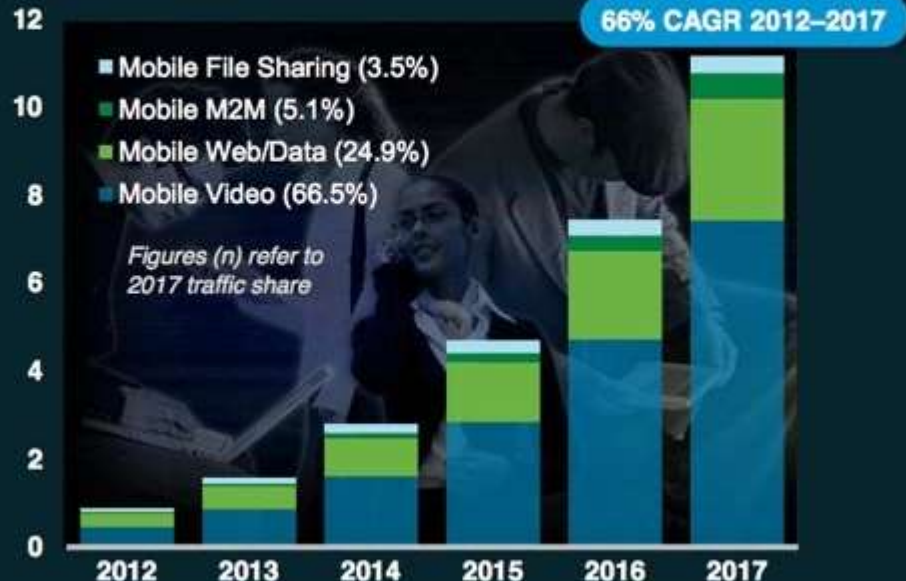
Global Mobile Data Traffic Growth / Apps

Video to Exceed 66 Percent of Mobile Data Traffic by 2017

Exabytes per Month

Petabytes per Month

Exabytes per Month



Source: Cisco

Source: Cisco

Source: Cisco

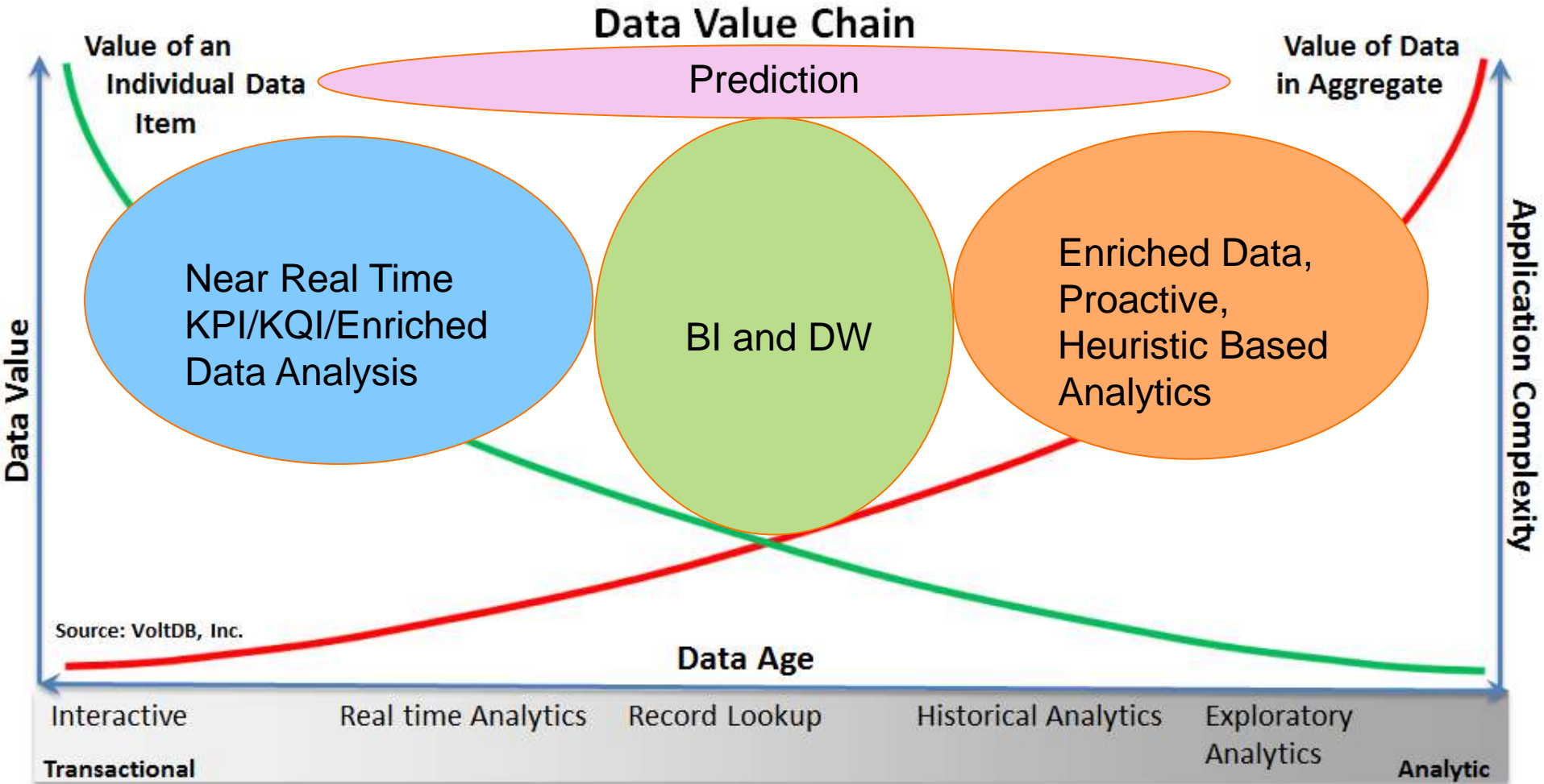
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Source: Cisco Visual Networking Index (VNI) Global Mobile Data Traffic Forecast, 2012–2017

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Data Value Chain

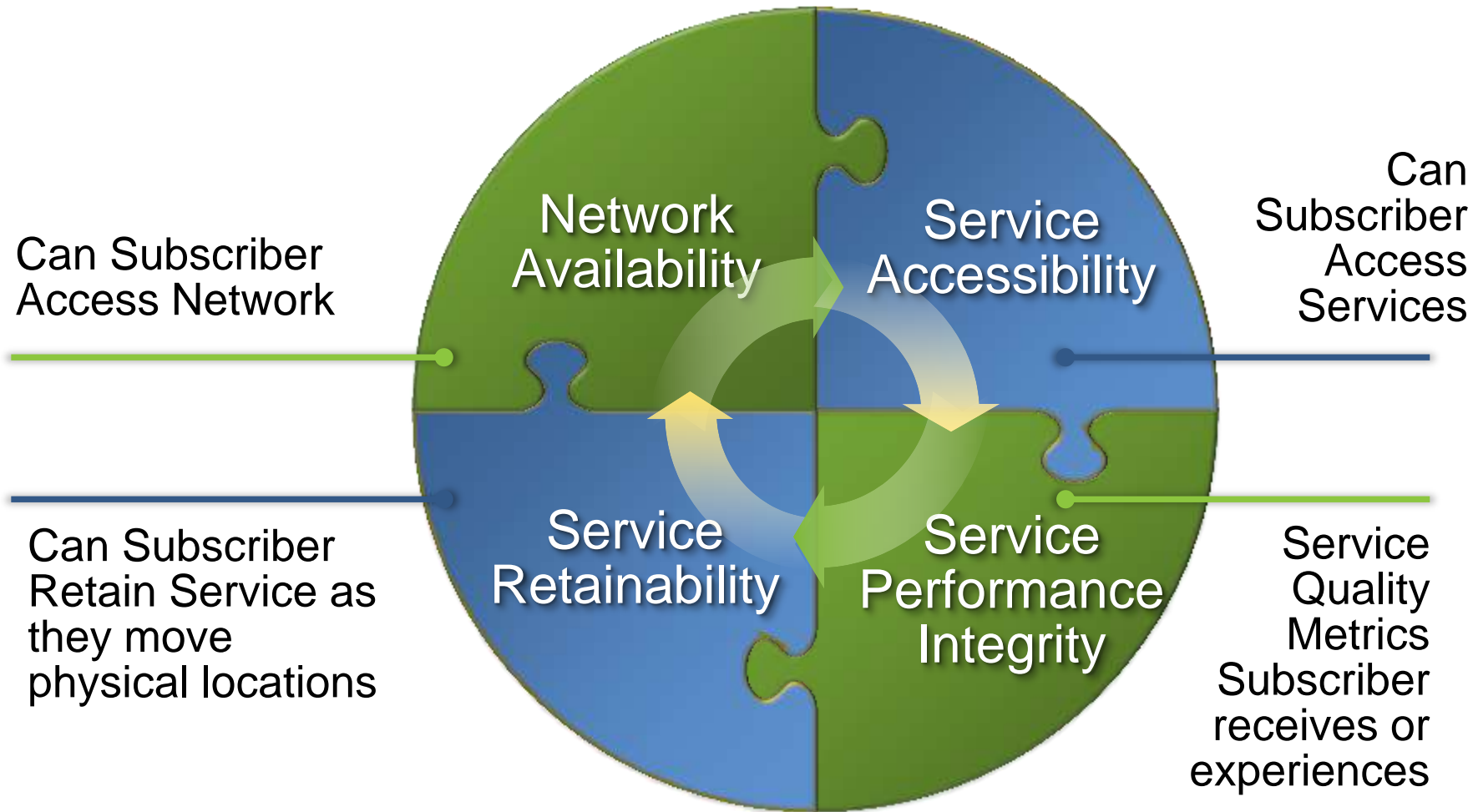


How to Transform Raw Data to Profitable Intelligence in Mobile Networks?

- Need to find the Signal from the Noise (Nate Silver)
- Tackle the problem from a Service Operation Center (SOC) approach (KPI -> KBO), where the “Subscriber” and “Service” is the focus to start because that affects profitability, ROI and growth
- Intelligently organize, aggregate, threshold, alert, filter and visualize data accordingly, leveraging the Data Value Chain
- Incorporate various type of data, including business data for example as part of your enrichment and correlation strategy

End-End Mobile Customer Service Experience

Four KPI Classes



Network Availability LTE KPI Examples

- **Network Availability – can the subscriber attach to the network (successful registration and authentication)**
 - **Network Attach Success Rate** - looks at the subscriber network attach requests and determines successful requests vs. failures
 - **Registration by Cell ID** - combines both network attach and authentication success, by cell id (location)
 - **Attach Failures by Cause** – similar to Network Attach Success Rate but for failures, determines the actual failure cause code (i.e. network unavailable, subscriber not authorised etc.)
 - **Authentication Success Rate** - determines whether the subscriber is actually provisioned correctly to utilise the network and services. Determines successful authentication requests vs. failures

Service Accessibility LTE KPI Examples

- **Service Accessibility – once attached, can the subscriber successfully access a specific service**
 - **Service Request Success Rate** - this determines whether network resources are available wrt. the subscribers location and authorization when a service is requested. Service request volume vs failures or rejects
 - **Volume of Sessions in the Active state** - once session is set up (i.e. bearer has been assigned and there is service or packet flow), determine those services or bearers active vs. idle
 - **Bearer Allocation Reject Reason Distribution (by APN, by Cause)** - when bearer requests fail, determines the cause (i.e. resources not available etc.) Also include APN associated with service being requested

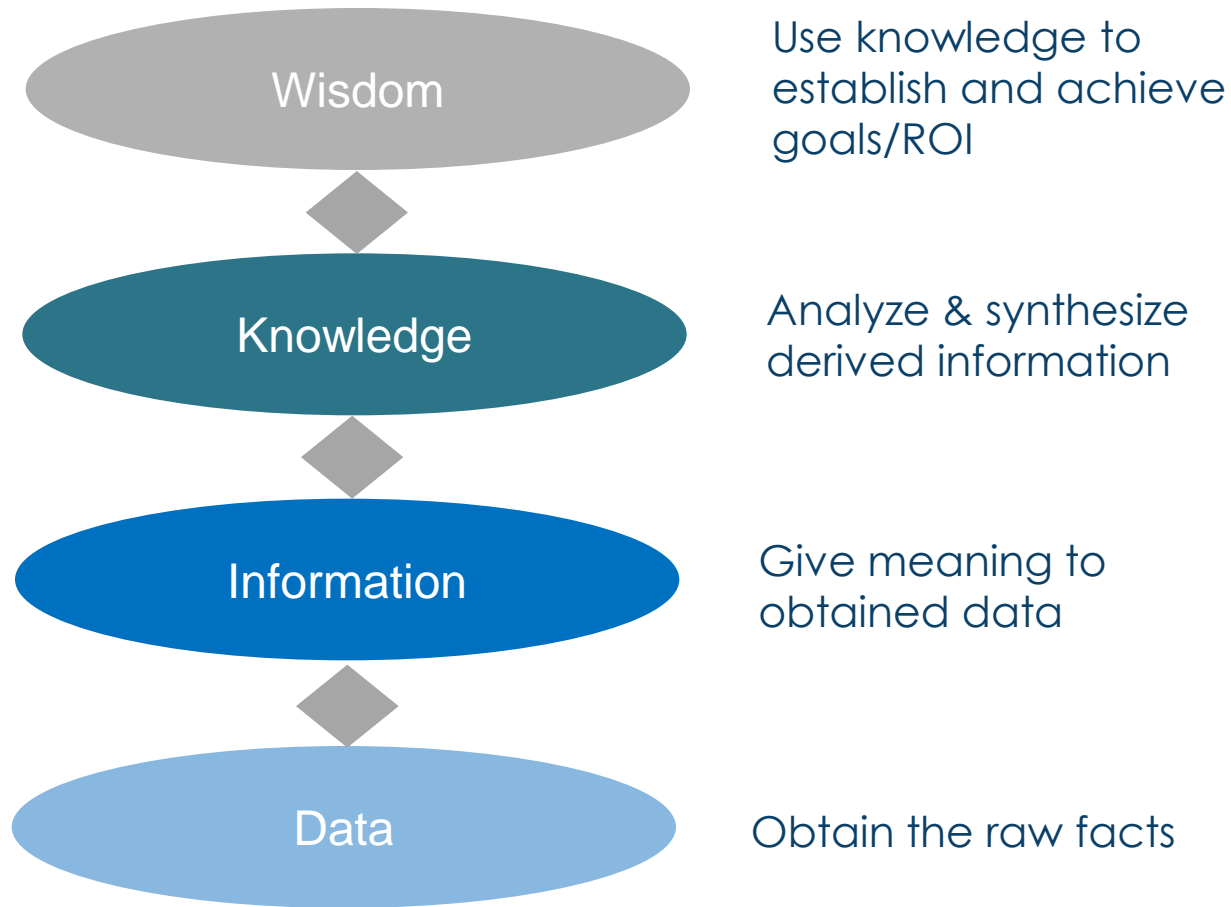
Service Retainability LTE KPI Examples

- **Service Retainability – can the subscriber retain or maintain service continuity as they roam**
 - Tracking Area Update (TAU) Success Rate - TAU is associated with a Mobility Management Entity (MME) in LTE. Determines success rate of whether a subscriber is roaming out of a MME serving area and into another
 - Home Subscriber Server (HSS) Update Location Success Rate - when a subscriber changes location an update request is sent to the HSS. Looks at requests vs failures
 - Inter-RAT Incoming, Outgoing Handover Success Rate 4G to 3G, 3G to 4G – when the subscriber roams out of say 4G coverage into 3G, even if they are not actually using a service at the time, device will go through the required access network hand over (HO). Looks at HO requests vs failures

Service Performance Integrity LTE KPI Examples

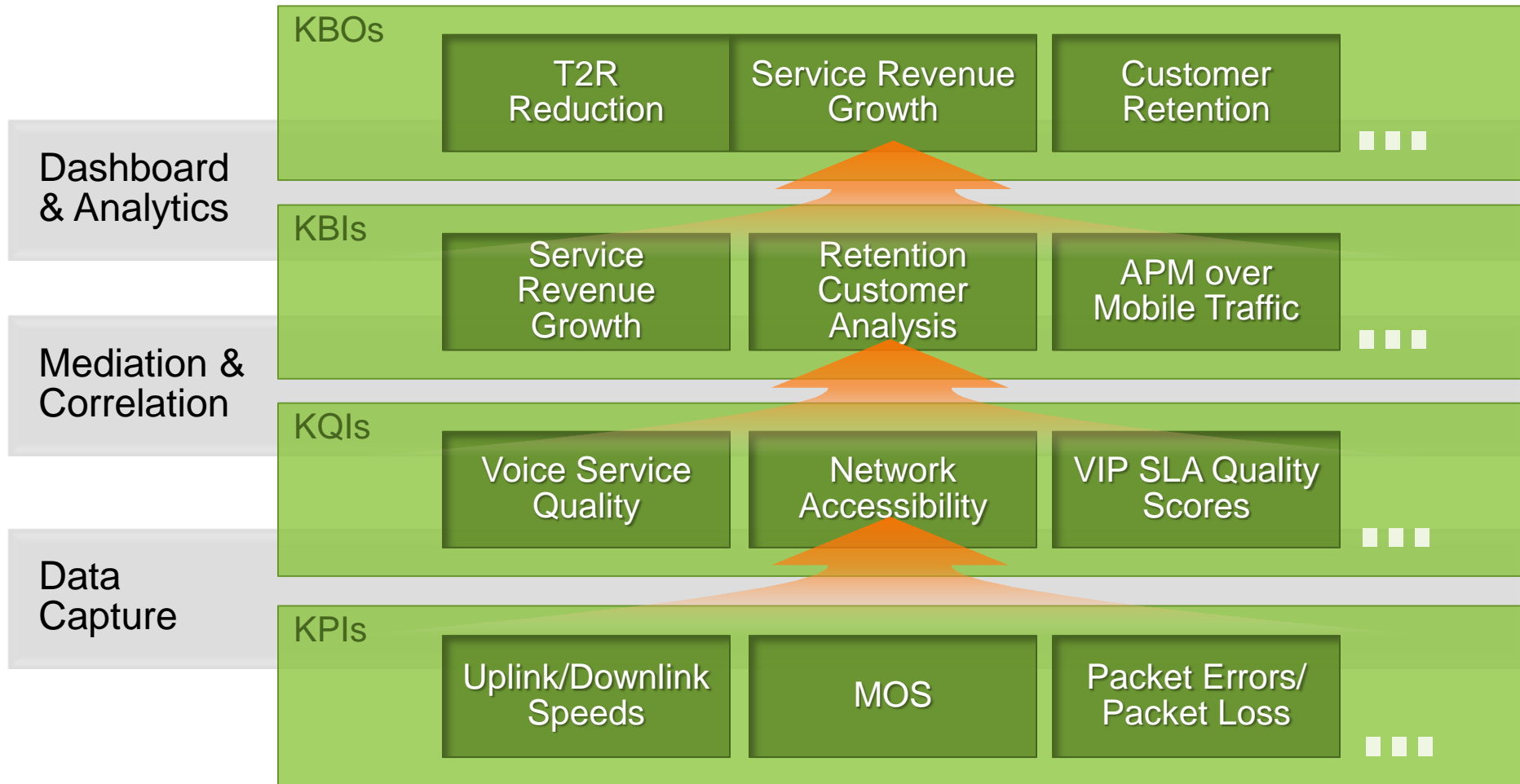
- **Service Integrity – actual subscriber service experience**
 - Bytes UL/DL - bytes associated with the service packet flow
 - Packet Loss Ratio – packets lost vs total
 - Retransmitted DL/UL % - retransmitted packets due to packet loss
 - URL Analysis – packet flow analysis by URL
 - User Agent Analysis - for every http service request, the device send a user agent which contains the device manufacturer, model and OS type etc. Often used to determine device incompatibility with the service being requested
 - Service Type e.g. P2P, HTTP, Secure HTTP, Email
 - Application (via DPI and enrichment) e.g. Skype, Facebook

Intelligence Continuum



Baker's depiction of the Knowledge Continuum, 2007

Service Operation Centre (SOC) KI Design



Use Case

SOC Use Case – VoLTE Service Assurance

Managed Service Provider (MSP) Problem

- A leading MSP in Asia has introduced HD Voice (VoLTE) to a select number of Corporate Customers (VIPs). Promoting this as delivering unrivalled quality and so customer experience, network wide...



- Voice quality is indeed good, but some of the customers/ VIPs begin to complain that calls in progress are being dropped while they are in transit i.e. as they move from location to location within the network.

- Trouble tickets are raised and then sent to the NOC to resolve. After investigation, existing Network Operations tools indicate that VoLTE calls are indeed being dropped. But the NOC personnel cannot determine which customers/ VIP are being effected and why...



Calls - Region Y		W: Interact	Setups: N/A	Lead	Graph
Key indicators	12:10 pm	12:15 pm	12:20 pm	12:25 pm	12:30 pm
Service Request Volume	10,208.26	10,196.10	10,218.86	10,196.12	10,202.37
ERAB Modifi.volume	3,146.84	3,145.84	3,146.89	3,146.77	3,147.01
Pages volume	0.00	0.04	0.04	0.00	0.00
ERAB Setup volume	243,997.90	242,838.80	251,842.00	248,348.00	247,518.00

SOC Use Case – VoLTE Service Assurance

Solution

- Working with the MSP, design a Customer centric, SOC focused dashboard specific to VoLTE service, delivering on a KBO of retaining key customers/ VIPs..



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Managed Object: New York 0 00 0 - May 04 2013 - Region: Post_Cover Average P50	
ID	Time
00000000000000000000	04/02/2013 12:07:08 PM
00000000000000000000	04/02/2013 12:07:11 PM
00000000000000000000	04/02/2013 12:07:14 PM
00000000000000000000	04/02/2013 12:07:18 PM
00000000000000000000	04/02/2013 12:07:17 PM
00000000000000000000	04/02/2013 12:07:18 PM
00000000000000000000	04/02/2013 12:07:23 PM
00000000000000000000	04/02/2013 12:07:28 PM
00000000000000000000	04/02/2013 12:07:44 PM
00000000000000000000	04/02/2013 12:07:48 PM
00000000000000000000	04/02/2013 12:08:00 PM

- By implementing the SOC approach, the MSP is able to deliver on its KBO by getting immediate (real-time) visibility of those customers / VIPs experiencing poor VoLTE service.

- The solution also enables the MSP to troubleshoot VoLTE issues at an individual subscriber level, and in this case, determine that the problem is actually related to a specific handset manufacturer, thus preventing further customer/ VIP dissatisfaction while enabling better vendor management...

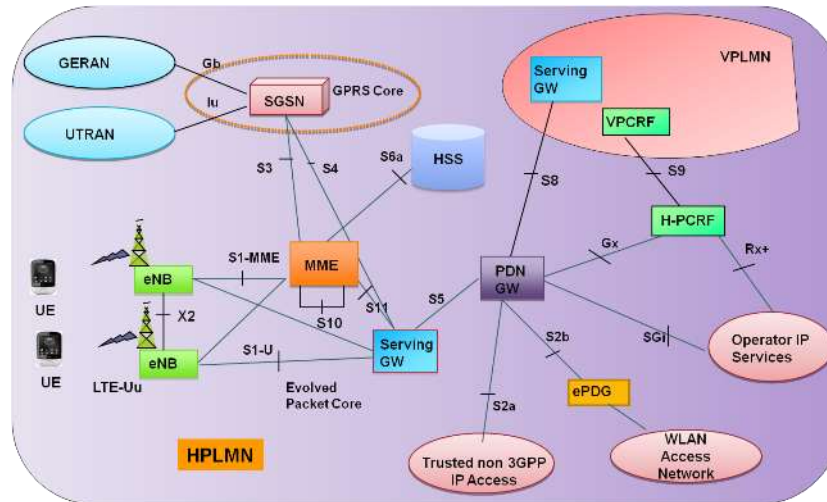


SOC Use Case – VoLTE Service Assurance

- KBO: Customer Retention
- KBI: Retention Customer Analysis
- KQI: Voice Service Quality + VIP SLA Quality Scores
- KPI: Uplink/Download Speeds + Mean Opinion Score (MOS) + Packet Errors/Packet Loss

SOC Use Case – VoLTE Service Assurance

- Control Plane KPI Classes: Availability, Accessibility and Retainability
- For LTE, looking at S1AP, S5/ S8, S6a and SGs for control plane
- User Plane KPI Class: Performance Integrity
- For LTE, looking at S1-U for user plane



Source: Iteworld.org

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