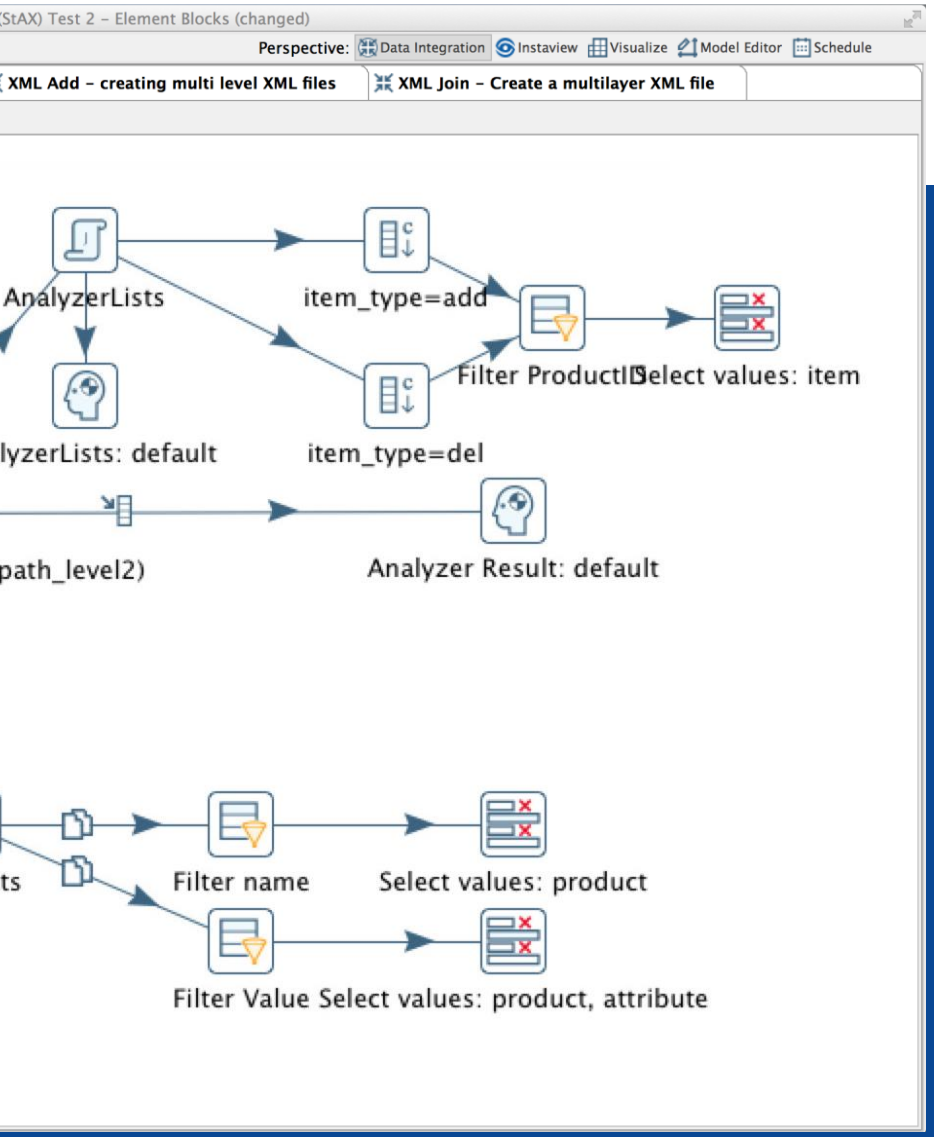

Strategic view of CDR analysis

Telecommunications Industry

Leonardo Morley
Product Manager, Cognus Chile
Pentaho Day 2017

Agenda

Strategic view of CDR analysis

- Big Data is a reality
- Opportunities and challenges for Telecoms
- Analytics in Telecommunications
- POC VTR with Pentaho

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The World is Changing

Big Data is a reality

DATA REVOLUTION

FASTER THAN PREDICTED

- Unstructured data doubling every 3 months
- 77% of that data is relevant to enterprises

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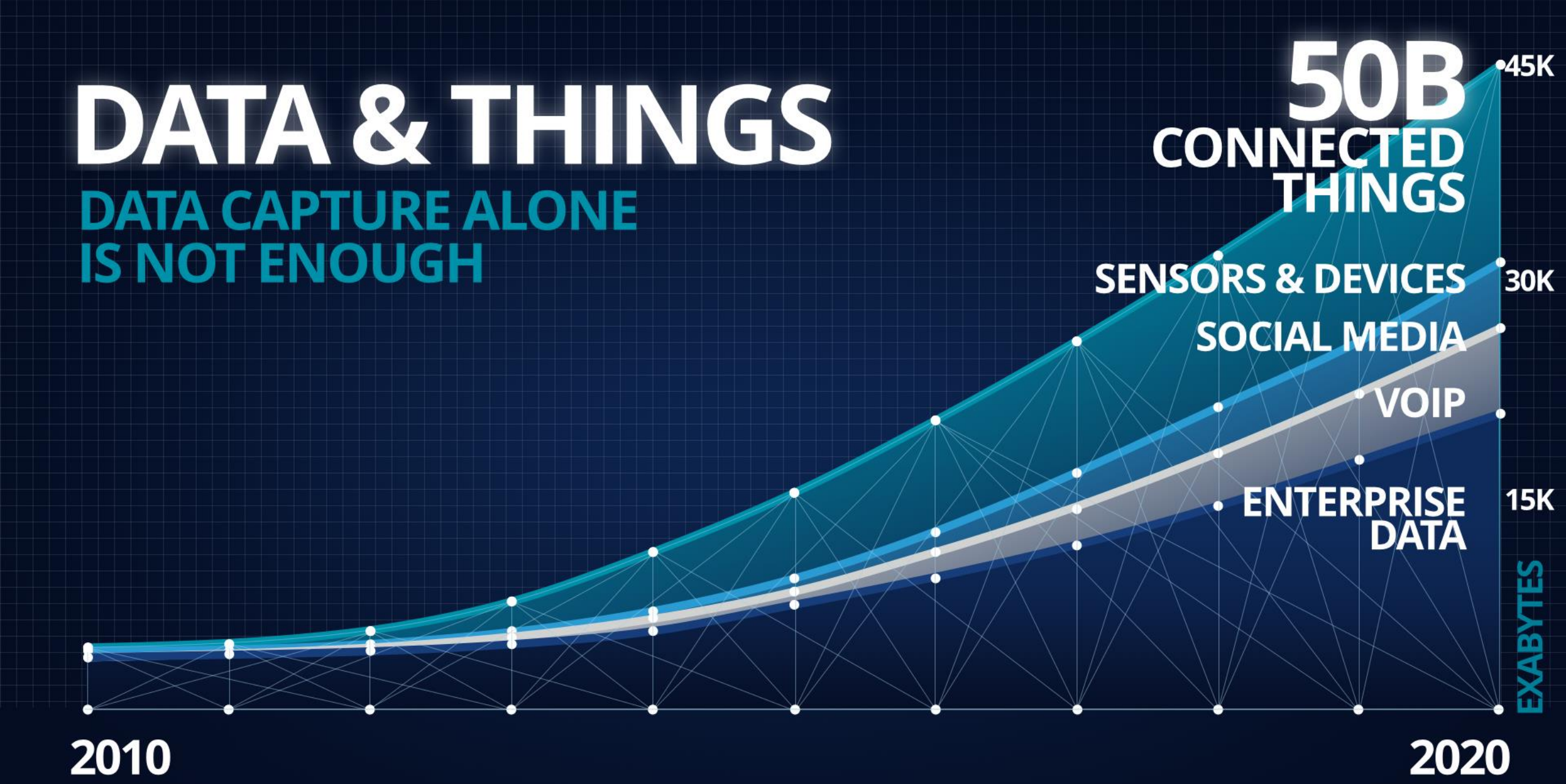
DATA & THINGS

DATA CAPTURE ALONE IS NOT ENOUGH



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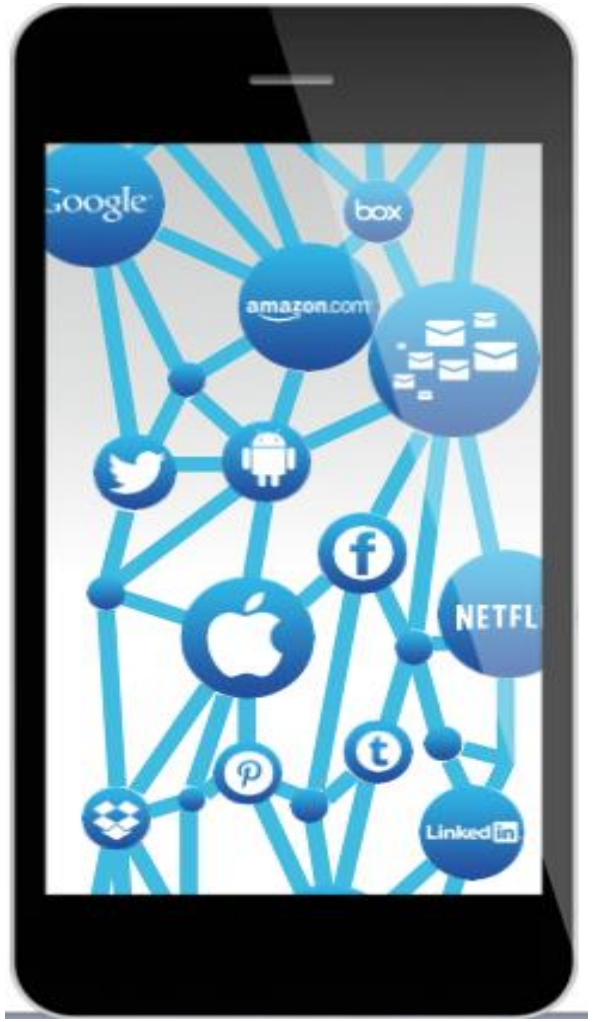
New Paradigms

New Technology Paradigms have Emerged



1. The universe of data is exploding and data is connecting people and things

2. New data architectures must blend and analyze all data regardless of source

3. Users will consume analytics in new ways: data driven apps

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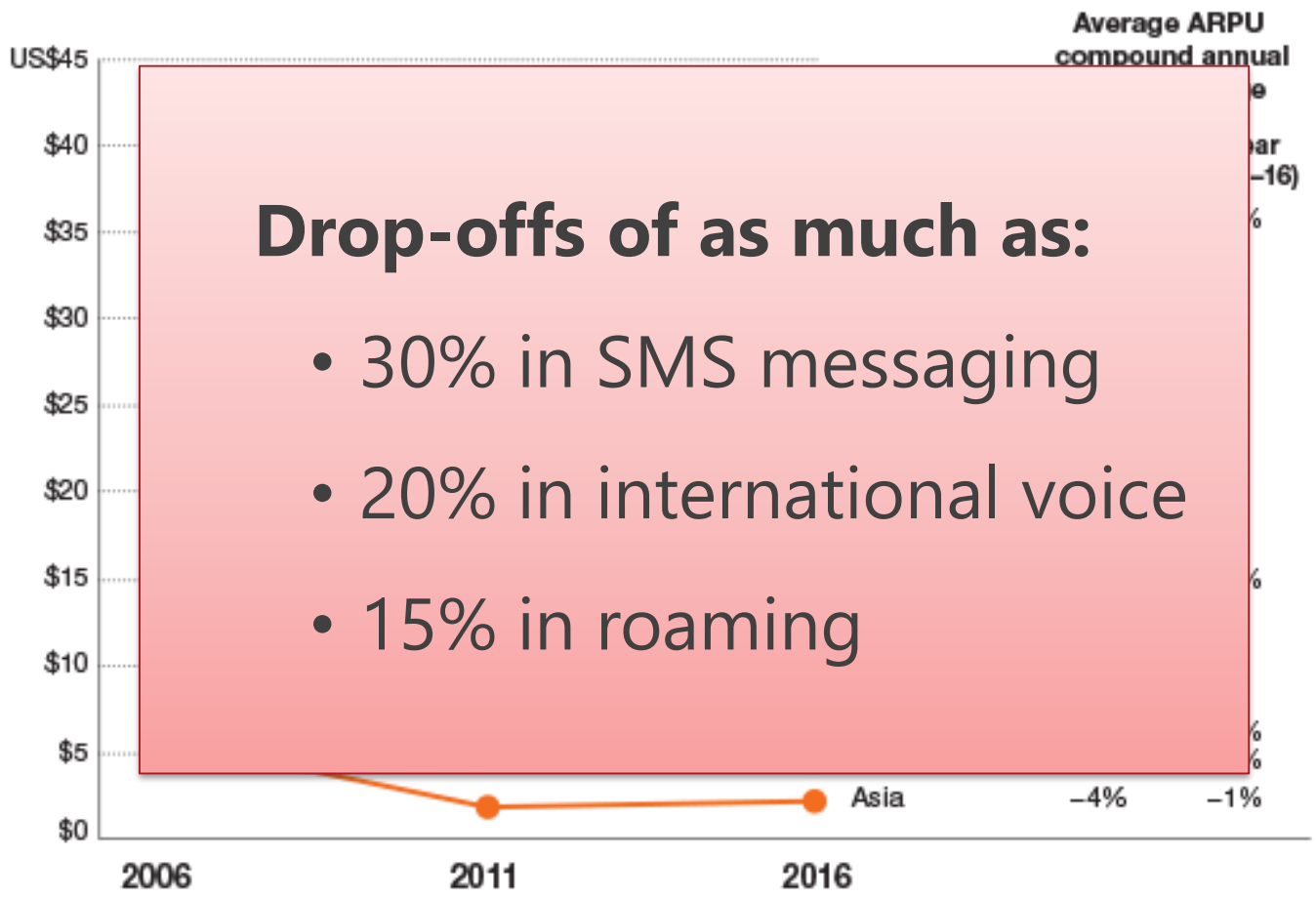
Opportunities and challenges

Telecoms

Opportunities and challenges

Revenue per User is falling

Average revenue per user in the telecom industry is falling in virtually every region



Source: Strategy& research and analysis

If you are a telecom executive at this critical juncture, you need to make two different moves at the same time. First, begin the task of **modernizing operations**.

Second, **redefine your strategic identity** (your value proposition) for the future

Opportunities and challenges

Being prepared

- Modernizing operations
  - Simplification — France's Free Mobile 2012 – 2016 (12 million users, 18% MS, US$1.6 billion in revenues over the first three quarters of 2016, 11% + 2015)
  - Digitization — Be linked digitally so that consumer activities are maintained in a single database
  - Network upgrades
- Redefining strategic identity
  - "In the ecosystem of digital content, operators hold a critical card: a direct line to customers."
  - M&A — Lack of capabilities required to create the product offerings and services needed for repositioning in the marketplace

Opportunities and challenges

Telecoms risks

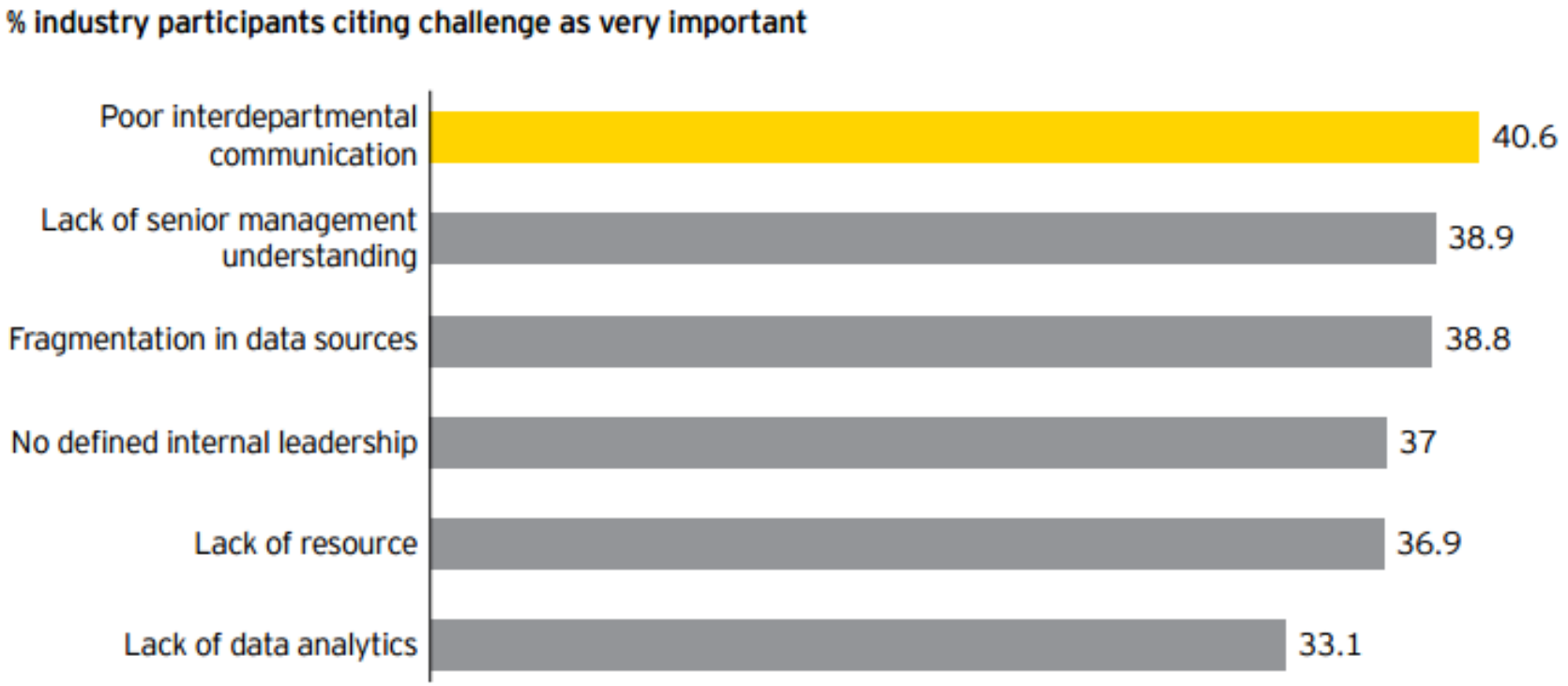
- Lack of data integrity to drive growth and efficiency
- Lack of performance measurement to drive execution
- Failure to understand what customers value
- Failure to adopt new routes to innovation

December 2016, ComputerWeekly, Angus Finnegan of law firm Taylor Wessing

Opportunities and challenges

Lack of data integrity

- Lack of data integrity to drive growth and efficiency



Source: "Industry survey 2014," Telecoms.com, February 2014 (2,100 respondents).

Operators have a natural competitive advantage in the big-data arena:

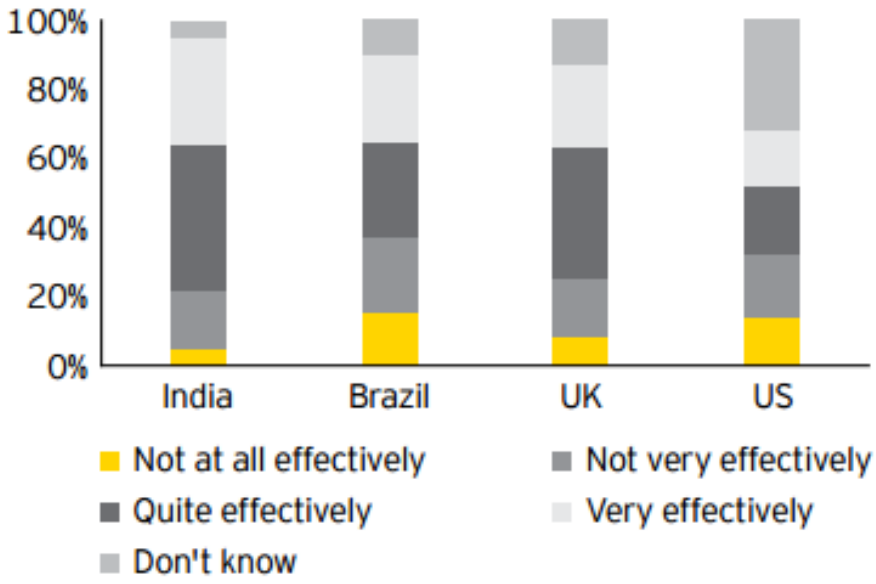
legacy of strong customer, network and product information assets.

Opportunities and challenges

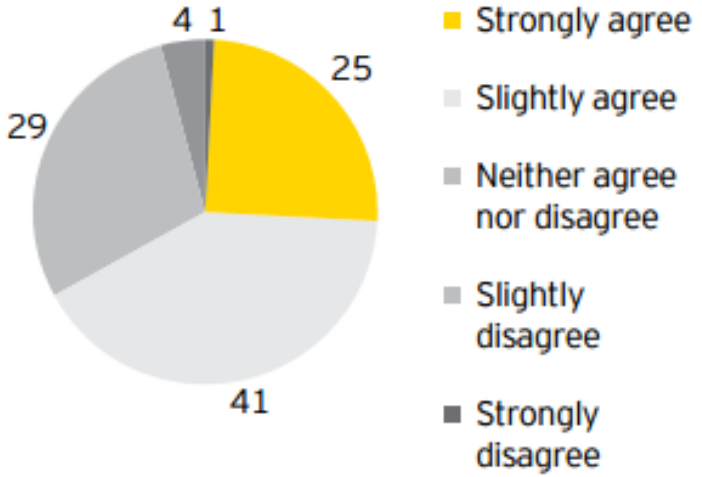
Failure to understand customers

- Failure to understand what customers value

Q. How well do you understand the mobile data tariffs offered by your service provider?



Q. Do you agree that the reliability of your broadband connection is more important than speed? (UK households)



A significant risk facing telecoms operators today is **failing to understand and address evolving customer needs and expectations**.

Source: *The mobile maze*, EY, October 2012 (online survey of 6,000 mobile users in 12 countries); *The Bundle Jungle*, EY, December 2013 (online survey of 2,500 UK households).

Opportunities and challenges

Telecoms

- New revenue streams
- Cope with declining margins
- Customer complaints
- Infrastructure to address data demands
- Standing out among the competition
- Service reliability
- Growth in IoT - Gartner predicts in 2020 will be 25 billion connections
- Diversification - content services
- Make Big Data a priority
- Embrace disruptive innovation

Opportunities and challenges

Speed of disruption challenging telecoms

- According to the telecommunications executives, KPMG International survey:
  - a similar proportion (70%) fear their businesses are not equipped for the new, disruptive world
  - just 11% feel strongly that their organization has a clear strategy and mission for disruptive technology
  - only 23% feel their company is very prepared in terms of a strategic vision for disruptive technology

Peter Mercieca, Global Chair, Media and Telecommunications, KPMG International

Opportunities and challenges

Speed of disruption challenging telecoms

- The survey found that telecom companies are using disruptive technologies to improve how they serve customers and support operational efficiency
- More than 70% say data and analytics (D&A), mobile, cloud, social media, the internet of things (IoT), marketing platforms, digital payments, and artificial intelligence (AI) are being used and changing how they serve their customers
- Overall they are using D&A (80%) to create real time change in the way they service customers (i.e. creating new products, services, delivery models, marketing approaches etc.)
- However it's not D&A, but IoT (54%) and wearables (53%) that are the top two technologies for supporting customers after their purchase thus enabling their companies to keep in touch with their customers every move – to predict and react to their needs

Peter Mercieca, Global Chair, Media and Telecommunications, KPMG International

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Analytics in the Telecom Industry

Analytics in the Telecom Industry

Cases

- Optimizing routing and QoS by analyzing network traffic in real time
- Analyzing CDR in real time to identify fraudulent behavior immediately
- Allowing call center reps to flexibly and profitably modify plans immediately
- Tailoring MKT campaigns to individual customers using location-based and social networking technologies
- Using insights into customer behavior and usage to develop new products and services
- Predictive Analytics
- Social Analytics
- Big data can even open up new sources of revenue, such as selling insights about customers to third parties

Analytics in the Telecom Industry

Potential data availability and usage

Internal data

Infrastructure build	Product development	Marketing & sales	Customer care	Billing
Network events	Product catalog	Customer devices	Order data	Call duration records
Call records (on and off network)	Product life-cycle data	**Option preferences**	**Contract data**	**Tariff data**
Number of text and multimedia messages	Product and platform costs	Sales channel data	Fault handling data	**Usage history**
Volume of data traffic	Innovation road map	**ARPU classification**	· Problem type	*Customer account data*
Location-specific data	Product usage	Response rate of marketing campaigns	· Resolution time and rates	
User handset data	Critical products	Segmentation data	· Repeated faults	
Technical fault data	Product delivery management	*Usage patterns*	Call center logs	
		Subsidy levels	Termination reasons	

Bold - Enhanced recommendation engine
Italic - Improved fraud management

Source: Strategy& analysis

Analytics in the Telecom Industry

A closer look

- Understanding New Product Offering Potential
- Improve Customer Experiences
- Reducing Customer Churn

Customer Behavior:

- voice, SMS and data usage patterns
- video choices
- customer care history
- social media activity
- past purchase patterns
- website visits, duration, browsing and search patterns

Customer Demographics:

- age, address and gender
- type and number of devices used
- service usage
- geographic location

Analytics in the Telecom Industry

A closer look

Customer Churn

It is far more costly to acquire new customers than to cater to existing ones

Common causes of churn include high prices, poor service, poor connection quality, new competitors and outdated technology

To prevent churn

- Combine variables (e.g., calls made, minutes used, number of texts sent, average bill amount) to predict the likelihood of change
- Know when a customer visits a competitor's website, changes his/her SIM or swaps devices
- Use sentiment analysis of social media to detect changes in opinion
- Target specific customer segments with personalized promotions based on historical behavior
- React to retain customers as soon as change is noted

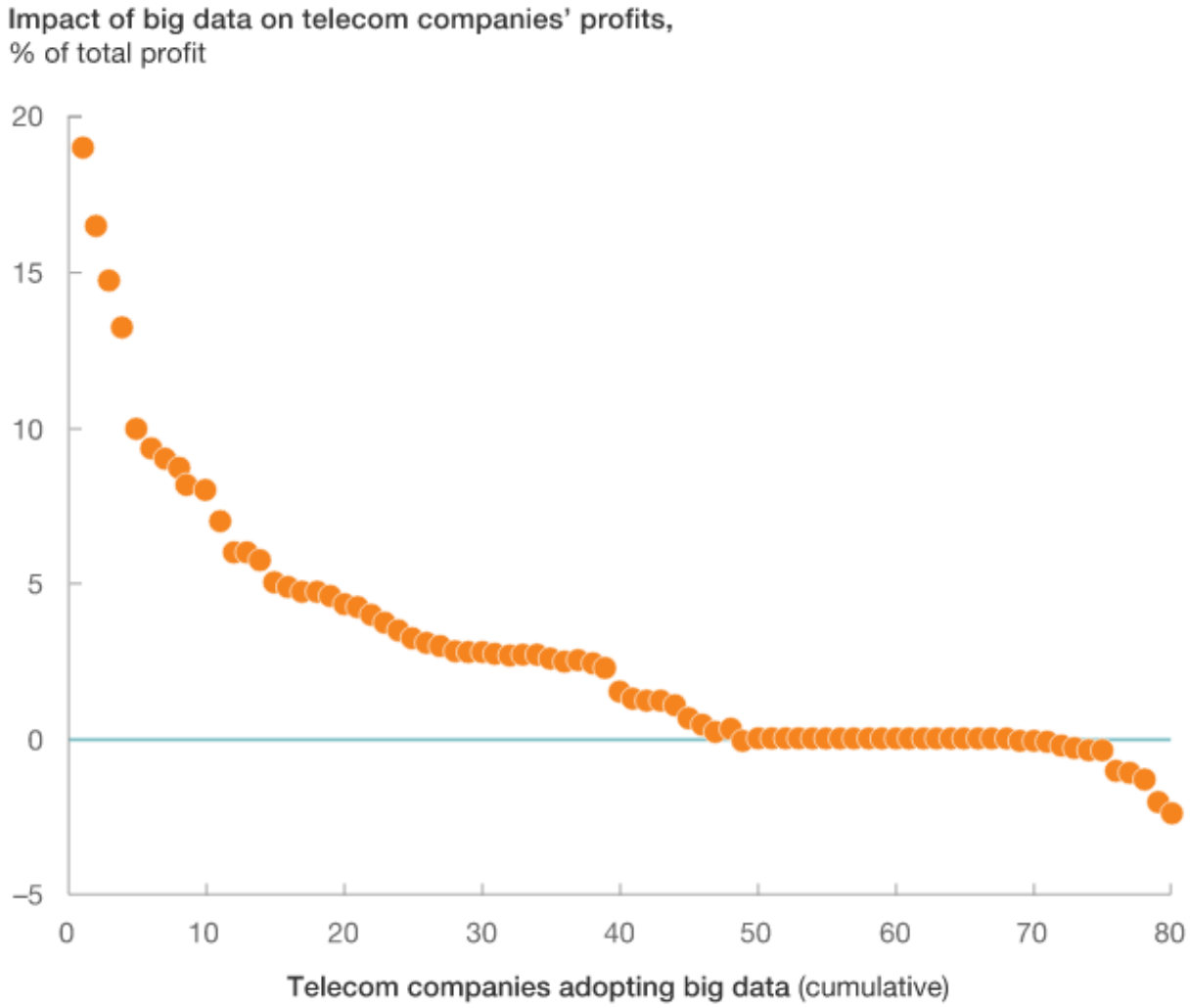
The Most Compelling Insights Come from Blending Data

"Which source of data represents the most immediate opportunity to transform your business?"

Summary of Analyst Surveys on Big Data: Gartner, Forrester and Ventana Research

Big Data Adoption in Telecoms

Adoption & impact on profits



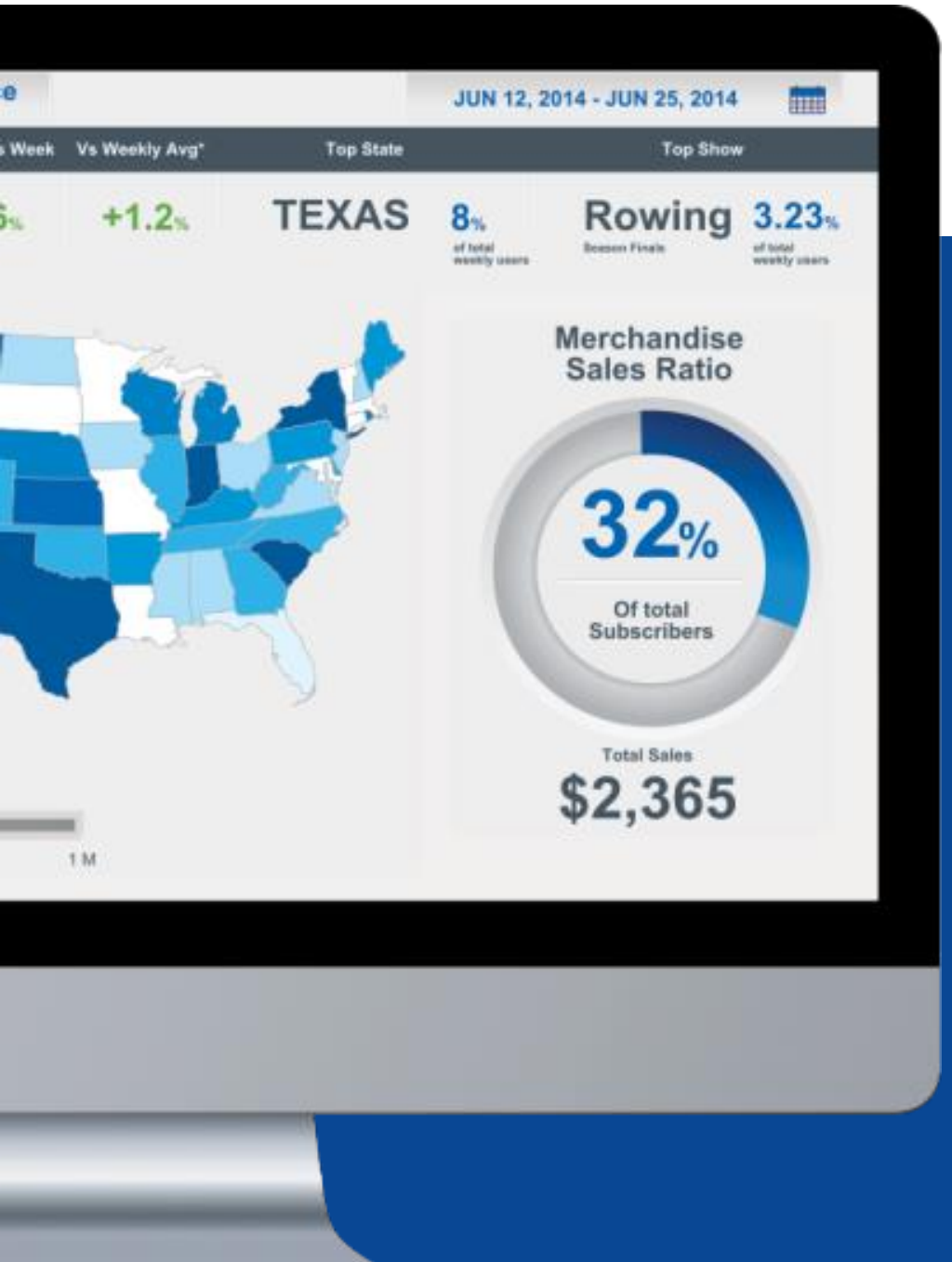
Source: 2015 McKinsey survey of 273 global telecom companies, 80 of which have made big data analytics investments.

80 companies of 273

Big data had a sizable impact on profits, exceeding 10%.

Many had incremental profits of 0 to 5 percent.

A few experienced negative returns.



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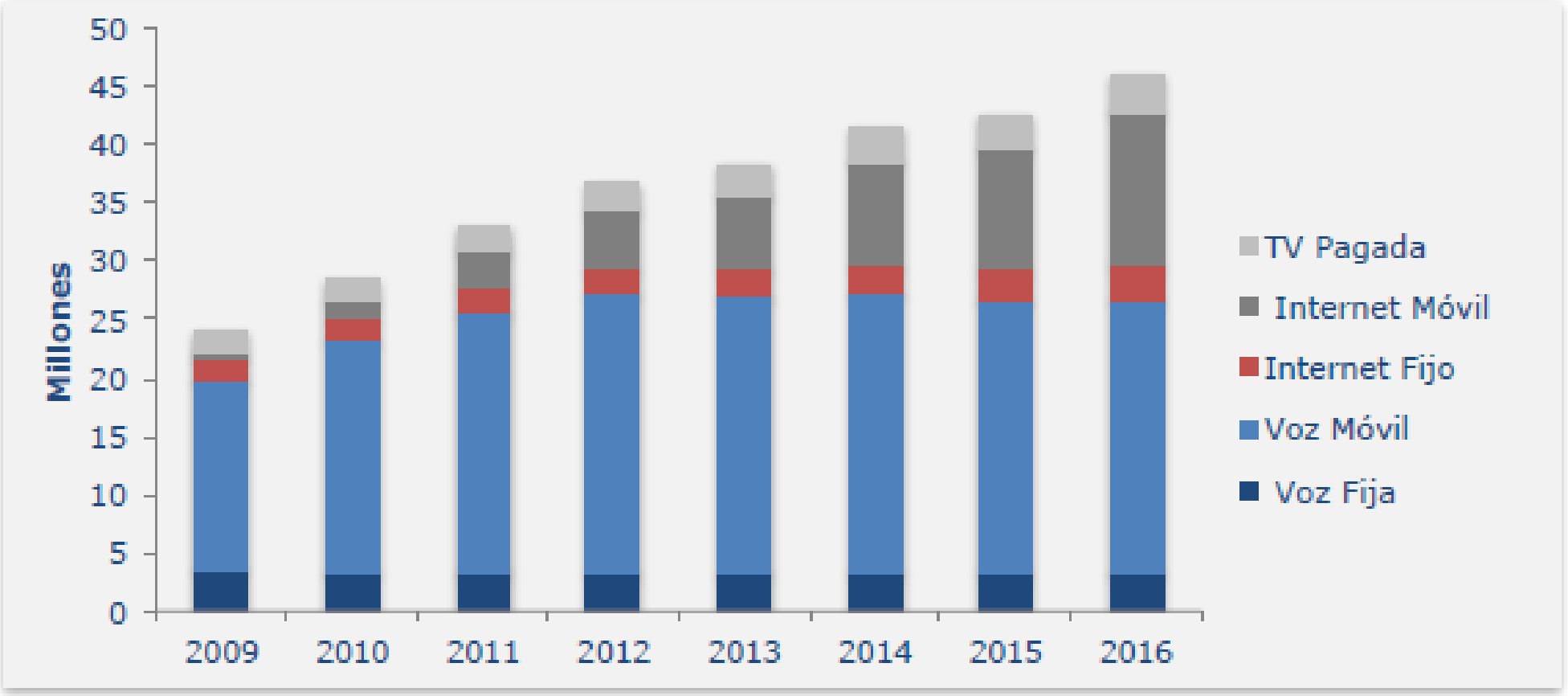
POC VTR

CDR + Analytics

Chilean market analysis

Subsecretaría de Telecomunicaciones - Subtel

Total de servicios (*) fin de periodo, millones

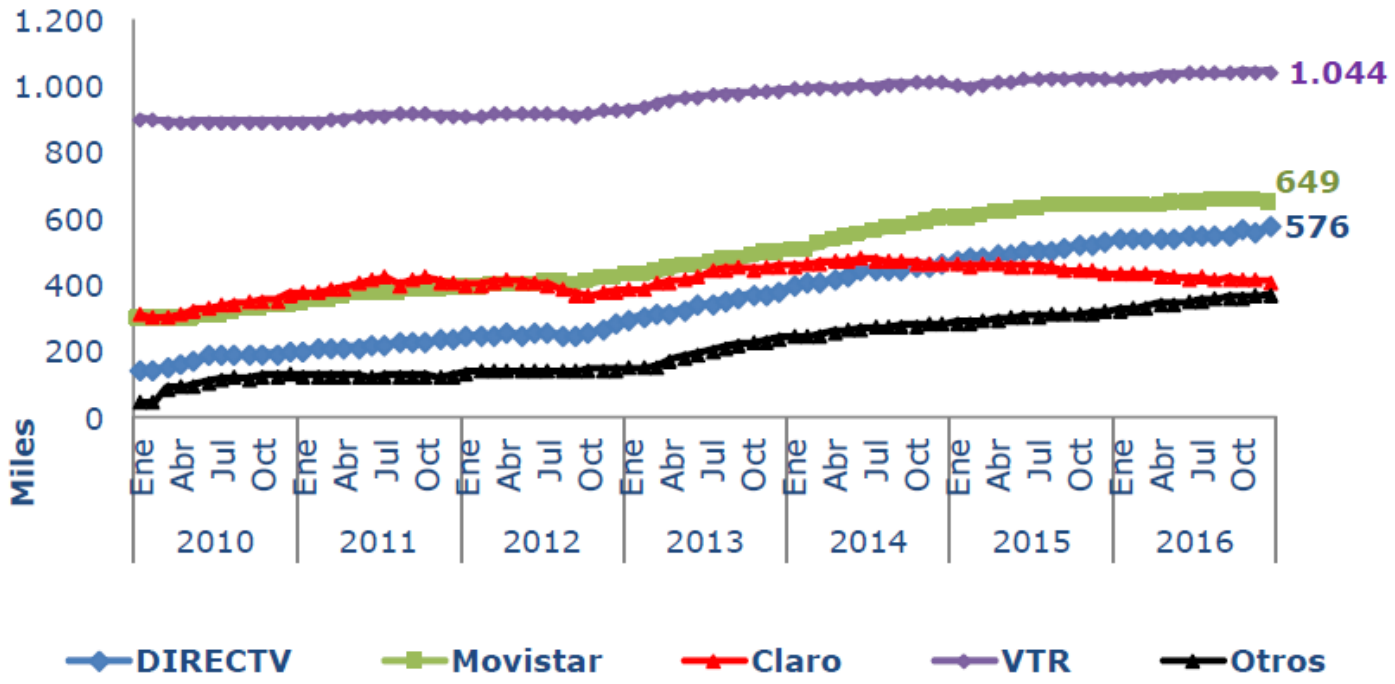


Chilean market analysis

Subsecretaría de Telecomunicaciones - Subtel

Televisión Pagada

Suscriptores por Empresa



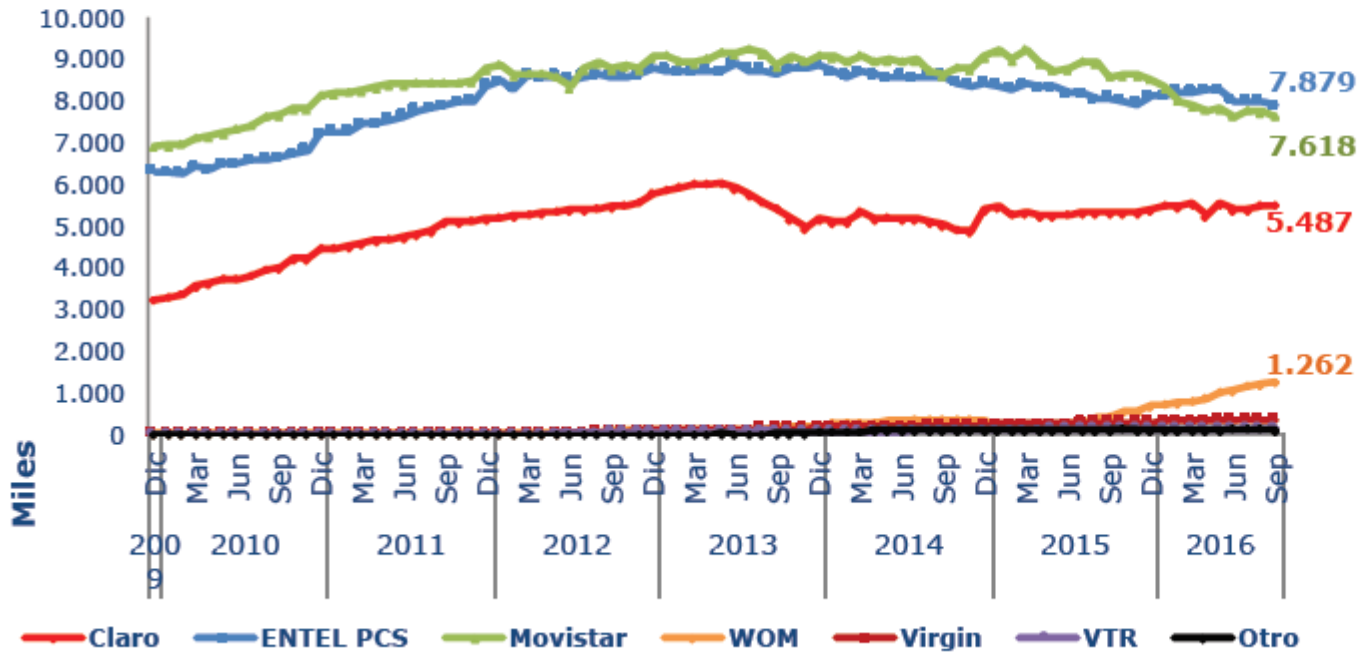
%Suscriptores TV por empresa	Dic 15	Dic 16
VTR	34,8%	34,2%
Movistar	21,6%	21,3%
Claro	14,8%	13,5%
DIRECTV	17,9%	18,9%
Otros	10,9%	12,1 %

Chilean market analysis

Subsecretaría de Telecomunicaciones - Subtel

Telefonía Móvil

Abonados por Empresa y Participación de Mercado



Participación de mercado	Dic 15	Dic 16
Movistar	36,6%	32,2%
ENTEL	35,0%	32,9%
Claro	23,2%	25,5%
Virgin	1,3%	1,5%
WOM	2,9%	6,7%
VTR	0,6%	0,7%
Otros	0,4%	0,5%

Chilean market analysis

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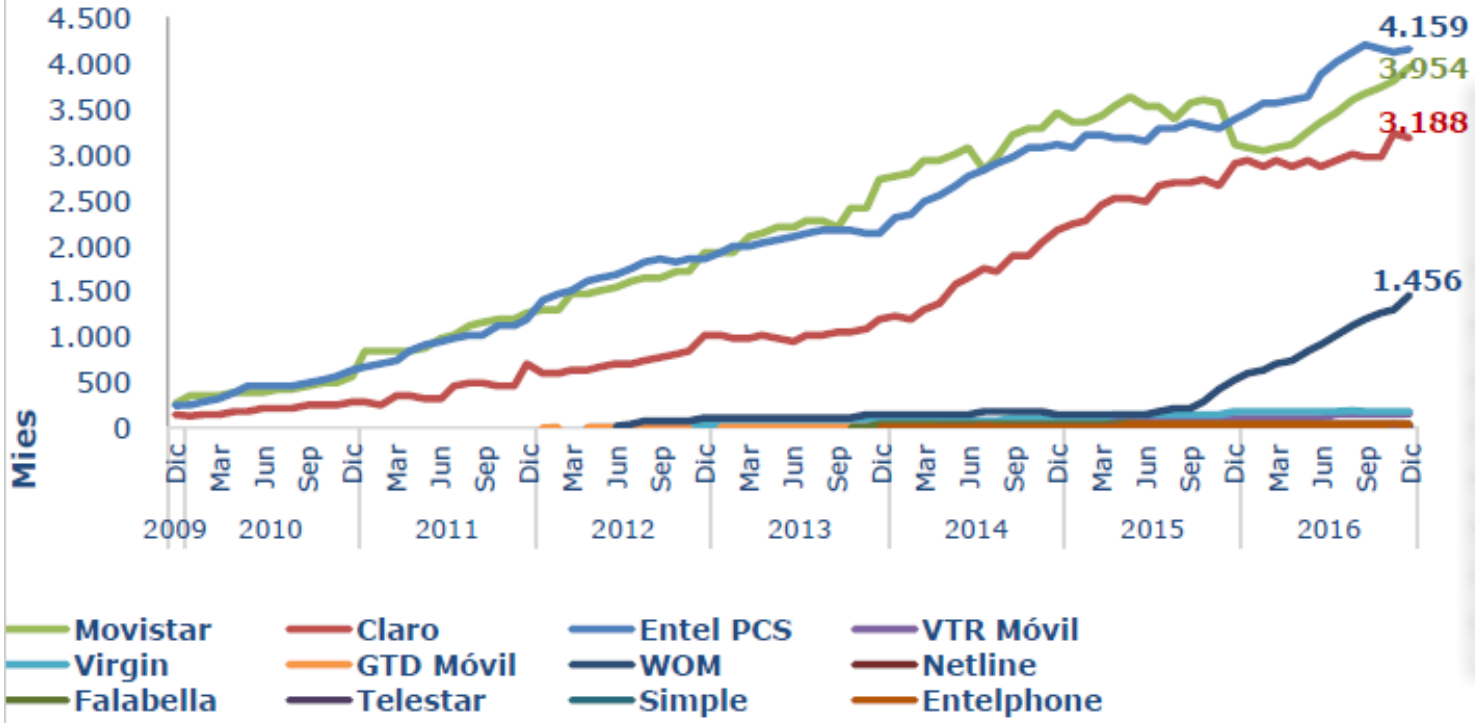
Internet Móvil (Conexiones 3G+4G)

Conexiones por Empresa y Participación de Mercado



%Participación Conexiones 3G+4G	Dic 15	Dic 16
Movistar	30,3%	29,9%
ENTEL PCS	32,9%	31,5%
Claro	28,1%	24,1%
Wom	5,1%	11,0%
VTR Móvil	1,1%	1,1%
Virgin	1,6%	1,4%
Falabella	0,5%	0,4%
Otros	0,4%	0,6%

VTR Market share

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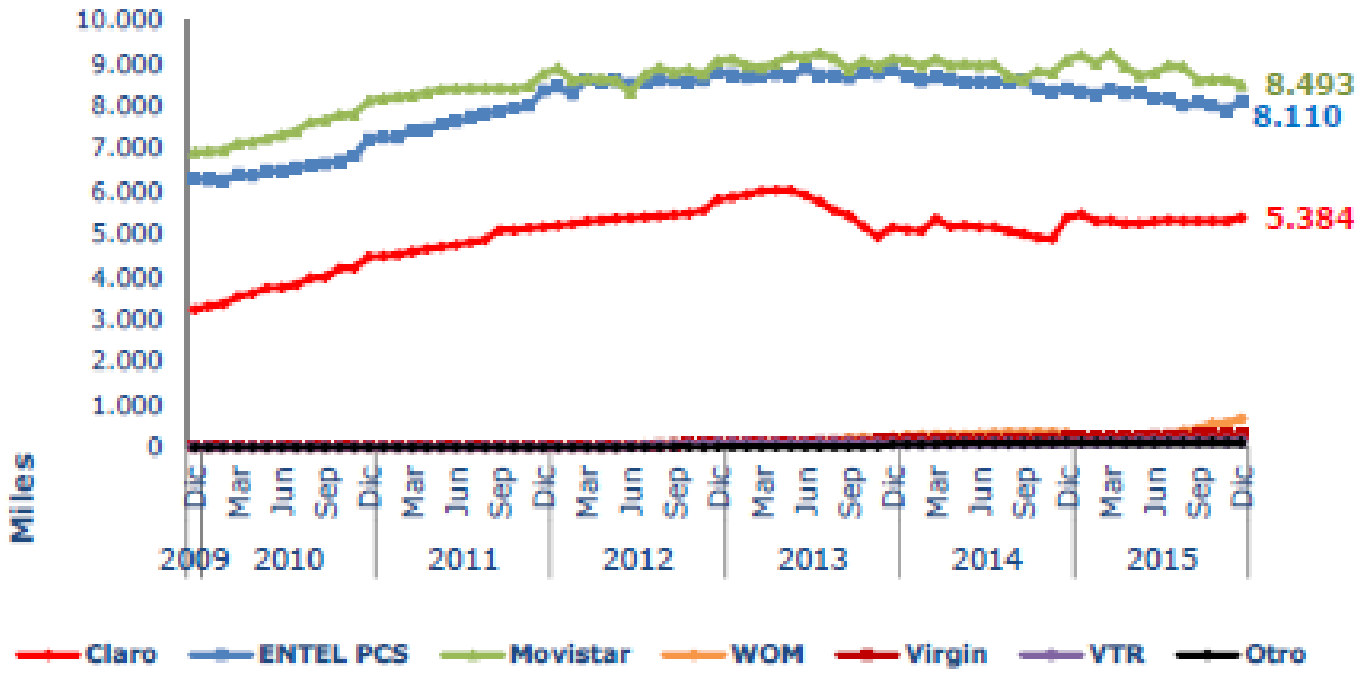
Telefonía Móvil

Abonados por Empresa y Participación de Mercado



Participación de mercado	Dic 14	Dic 15
Movistar	38,3%	36,6%
ENTEL	35,6%	34,9%
Claro	22,7%	23,2%
Virgin	1,0%	1,3%
WOM	1,4%	2,9%
VTR	0,4%	0,6%
Otro	0,6%	0,5%

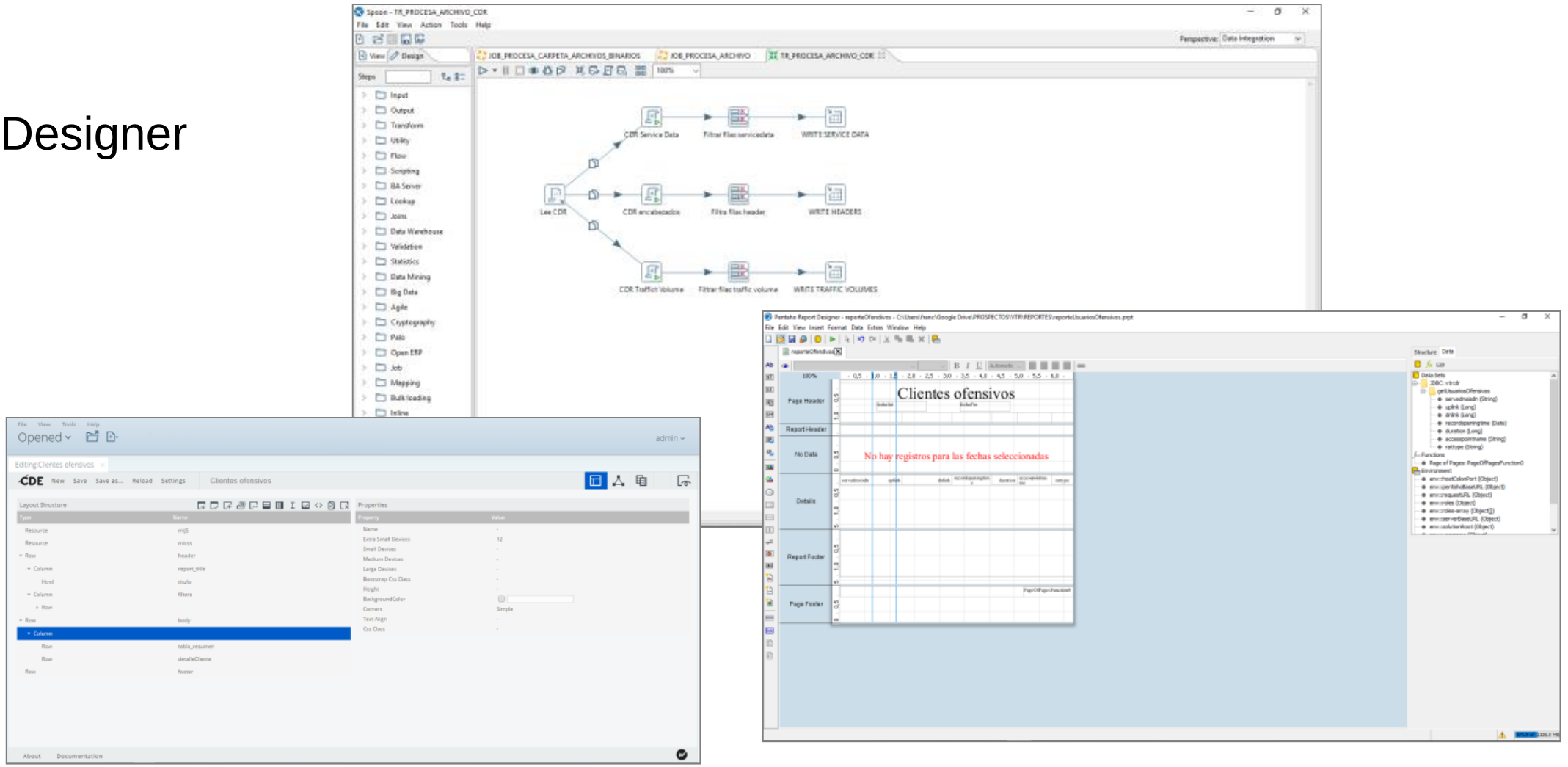
POC VTR

- Alcance
  - VTR necesita procesar los archivos CDR (binarios) de manera automática y rápida para poder cargar la información que contienen en su prototipo de Data Lake.
- Criterio de evaluación
  - La base de datos generada permitirá realizar consultas y alimentar tableros de control que permitan detectar eventos anormales en el tráfico de datos de los clientes y consultar de manera eficiente registros históricos.
- Arquitectura propuesta
  - Para esta POC se trabajó con PDI (Pentaho Data Integration) para el procesamiento de los archivos y el servidor BI de Pentaho más CTools para elaborar tableros.

POC VTR

Components

- PDI
- Report Designer
- Ctools

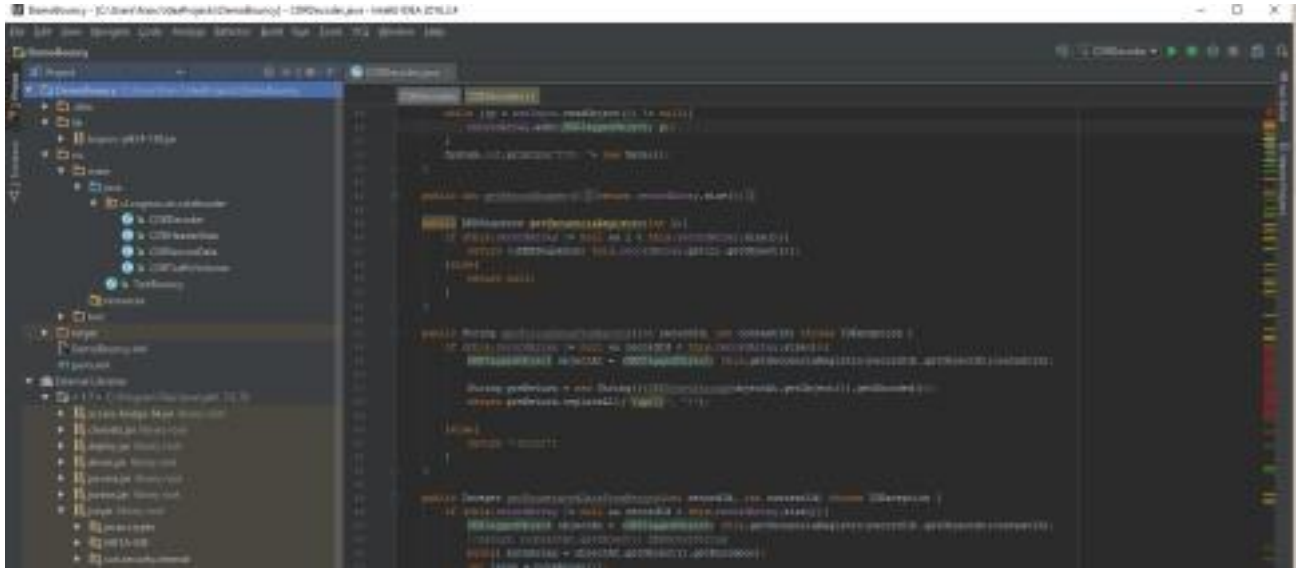


POC VTR

Components - CDR Processing

- Para el procesamiento del archivo binario CDR se implementó una librería en JAVA la que parsea un archivo CDR y permite obtener cada registro en formato texto.

- Para esta implementación se utilizó JAVA y la librería BouncyCastle.



POC VTR

CDR Analytics overview

- CALL DETAIL RECORDS (CDR)
  - CDR tracks every voice, SMS, and location service
  - Can be combined with data navigation (EDR -Event Detail Record)
  - Nowadays, basic for billing, fraud management and profit leakage
  - Optimizing network routing and QoS in real-time in Crisis Events

Can provide insights into the telecom activity like:

- inbound calls,
- outbound calls,
- dropped calls,
- abandoned calls,
- unanswered calls,
- #of text messages,
- calling minutes
- Etc……

POC VTR

CDR Analytics – More than technical issues

DATA-POP ALLIANCE

HARVARD HUMANITARIAN INITIATIVE

mit media lab

FLOWMINDER.ORG

2014 Ebola crisis

"… technical issues to ethical and commercial considerations… "

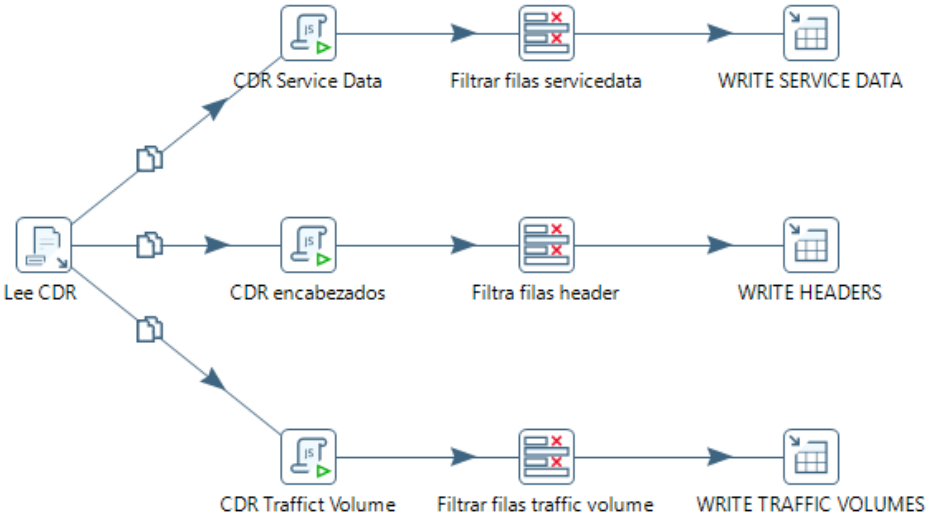
"… privacy and security implications… "

http://datapopalliance.org/

POC VTR

CDR Processing

- Se generaron varias ETL coordinadas por un JOB que se encarga de revisar una carpeta en busca de archivos CDR.
- Si encuentra, los procesa uno a uno y luego los mueve a una nueva carpeta donde deja los archivos ya procesados.
- Los datos del archivo CDR se graban en tres tablas: CDR_SERVICE_DATA, CDR_HEADER, CDR_TRAFFIC_VOLUME.
- La llave que une los datos es el nombre del archivo CDR y el número de registro



POC VTR

CDR Data visualization

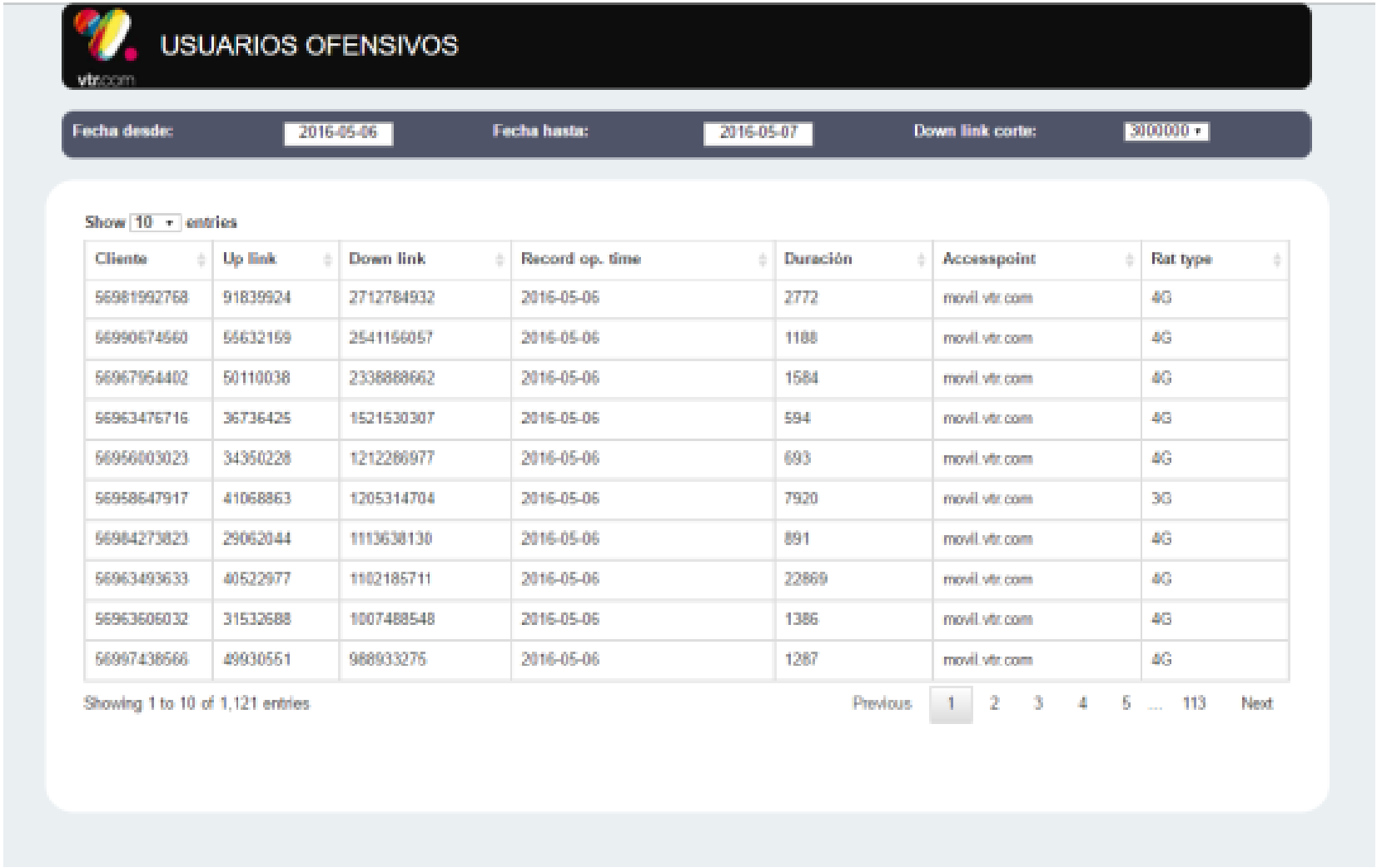

Clientes ofensivos

- Listado de usuarios/clientes ofensivos
  - Reporte estático que muestra los clientes ofensores por consumos excedidos de tráfico de datos, el campo a validar es

DATAVOLUMEGPRSDOWNLINK > 3000 MB

POC VTR

CDR Data visualization

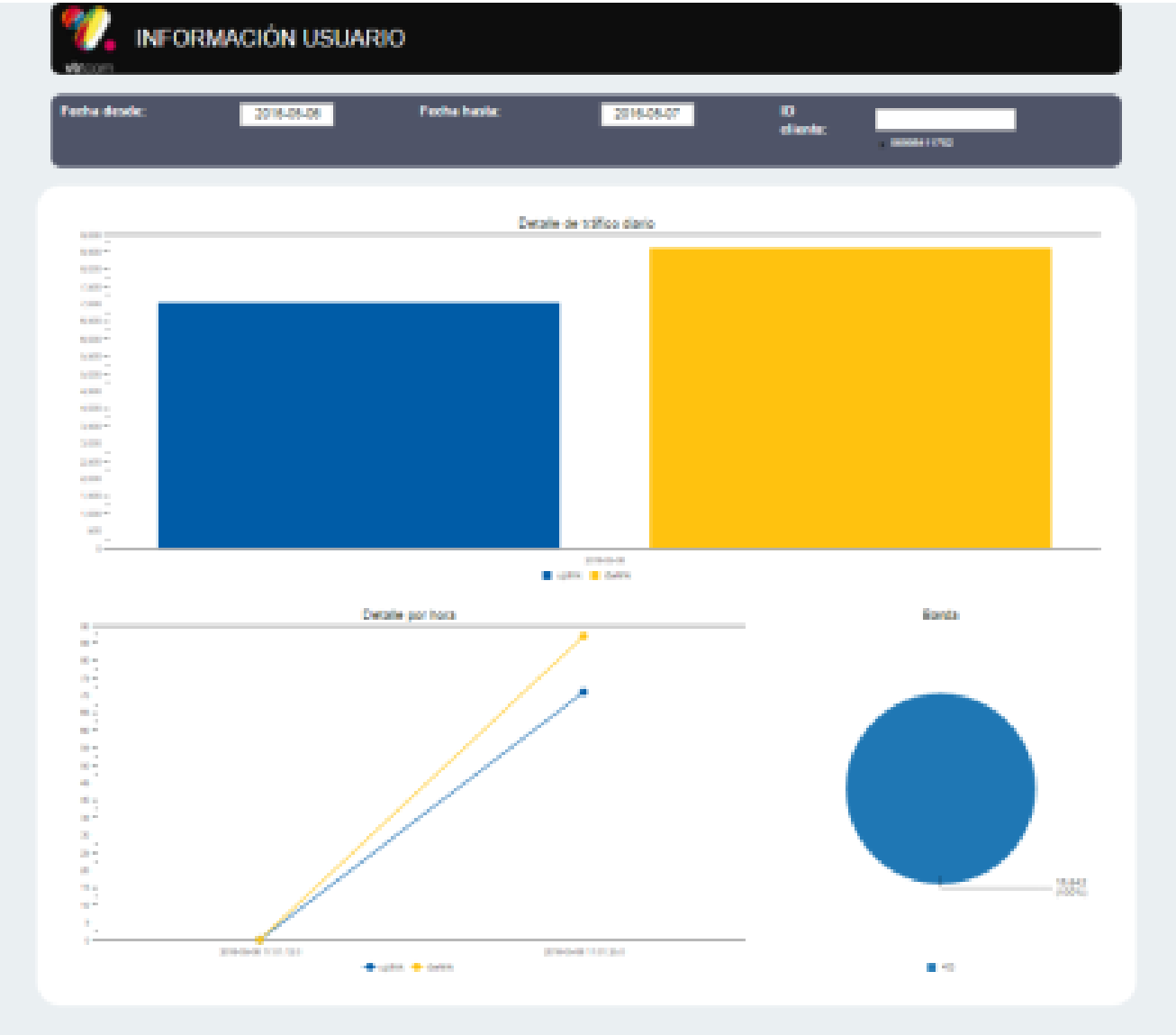


- Listado de usuarios/clientes ofensivos (Dashboard CTools)

POC VTR

CDR Data visualization

- Listado de toda la información de un usuario/cliente específico para consultas de la área legal



POC VTR

Results

- Se implemento con ETL de Pentaho una herramienta que permite procesar automáticamente los archivos binarios CDR que utiliza VTR y almacenar su contenido en una base de datos SQL Server

- La velocidad de procesamiento de los archivos fue de aproximadamente 1,7 segundos por archivo. De todas formas se indico que esto se puede mejorar contando con una maquina de más procesadores (La maquina utilizada para la prueba solo tenía un procesador)

- Se construyeron los tableros y reportes requeridos. Además se indico la capacidad de poder realizar tableros mucho más avanzados (georeferenciación, etc.) utilizando CTools y Pentaho.

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Questions and Discussion

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Thank You