# Simplificando la Operatividad, entregando valor al negocio desde la automatización y la convergencia.

**Primestone - Utility Day**

**Oscar Linares**
**LAD Senior Sales Consultant**
**Converged Infrastructure – Engineered Systems**

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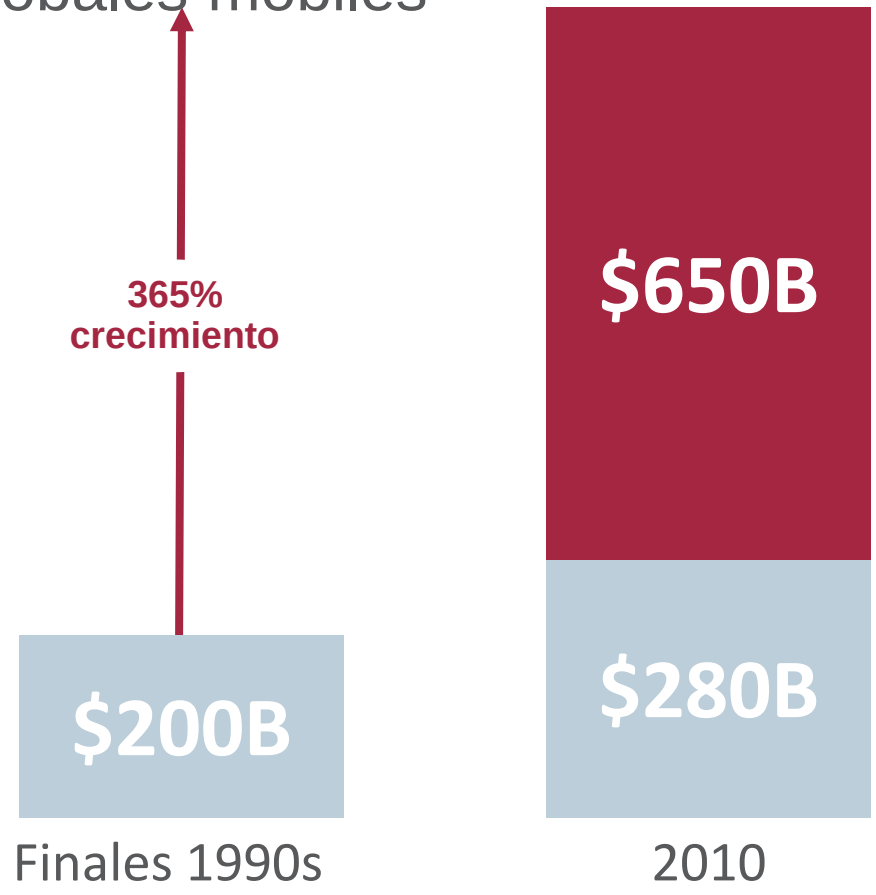
“Las Utilities del futuro no se verán como se ven hoy en día”

# Aprendiendo de la pasada disrupción

Ejemplo: Telecom Industria, ventas globales mobiles




Nuevas Fuentes de Ingreso – ampliamente capturadas por **nuevas compañías**

Fuentes tradicionales de ingreso – ampliamente capturadas por actuales **compañías**

*Source: McKinsey, The Agile Utility, 2015*

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# Tecnologías Transformacionales

Cualquier tecnología que requiera un cambio de los procesos de negocio o de los modelos de negocio para ser usada masivamente.

Ejemplos pasados:

- Computación
- Internet
- Dispositivos Móviles

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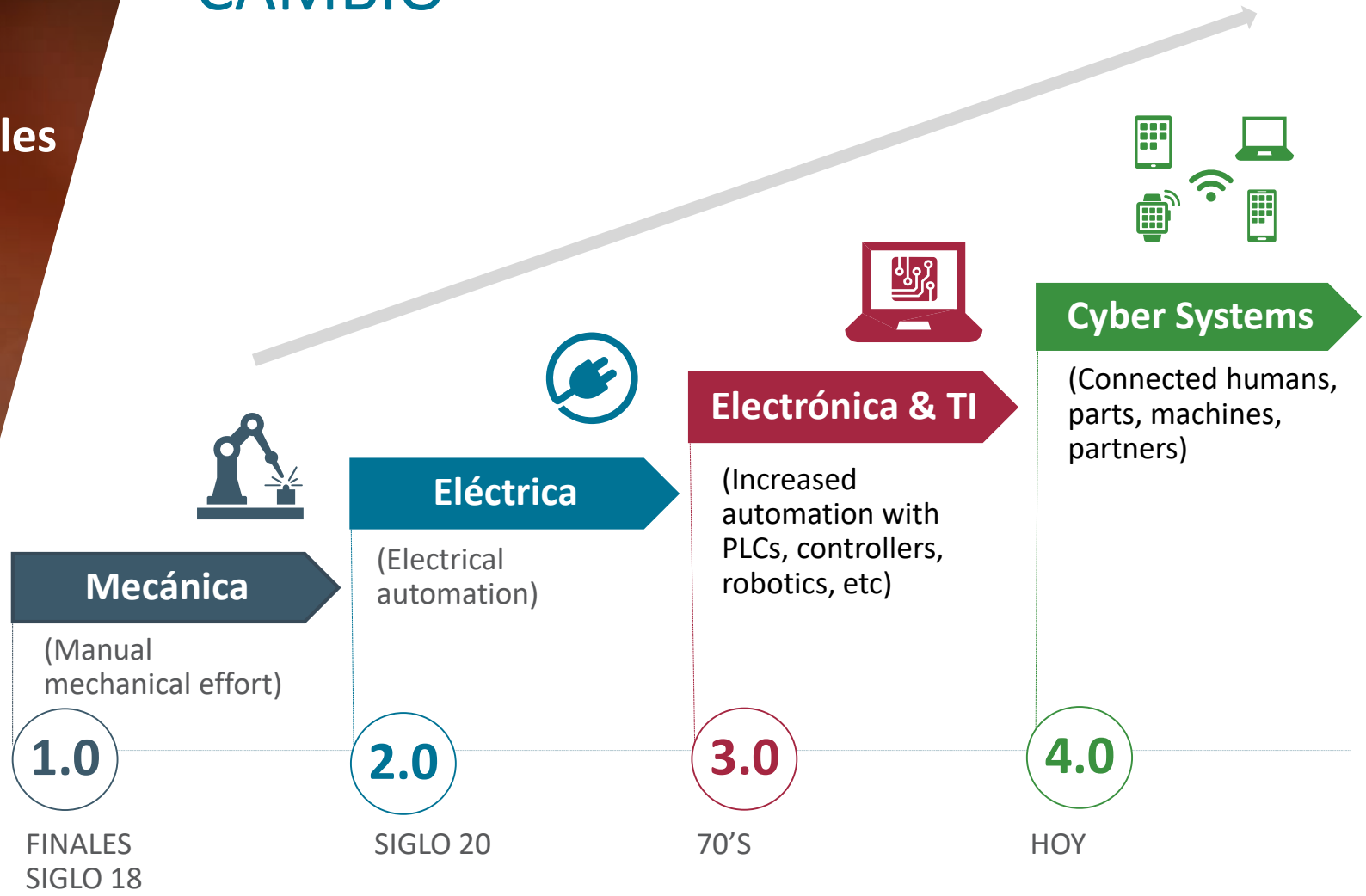
# **INDUSTRY 4.0** HABILITANDO EL CAMBIO

**Tecnologías Operacionales de siguiente generación son Digitales desde su creación.**

- Impresoras 3D, Cobots, herramientas AGVs… **deben estar conectados**.
- **Inteligencia Artificial** ejecutará operaciones complejas
- Innovaciones vendrán de los datos y mejora digital
- TO Digital son seguras y **empresariales por definición**.

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# ¿Los desafíos hoy?

**Se pueden resumir en 3 tecnologías**

Internet of Things

Artificial Intelligence
y Machine Learning

Blockchain

Todas, oportunidades sin precendentes y nuevos desafíos

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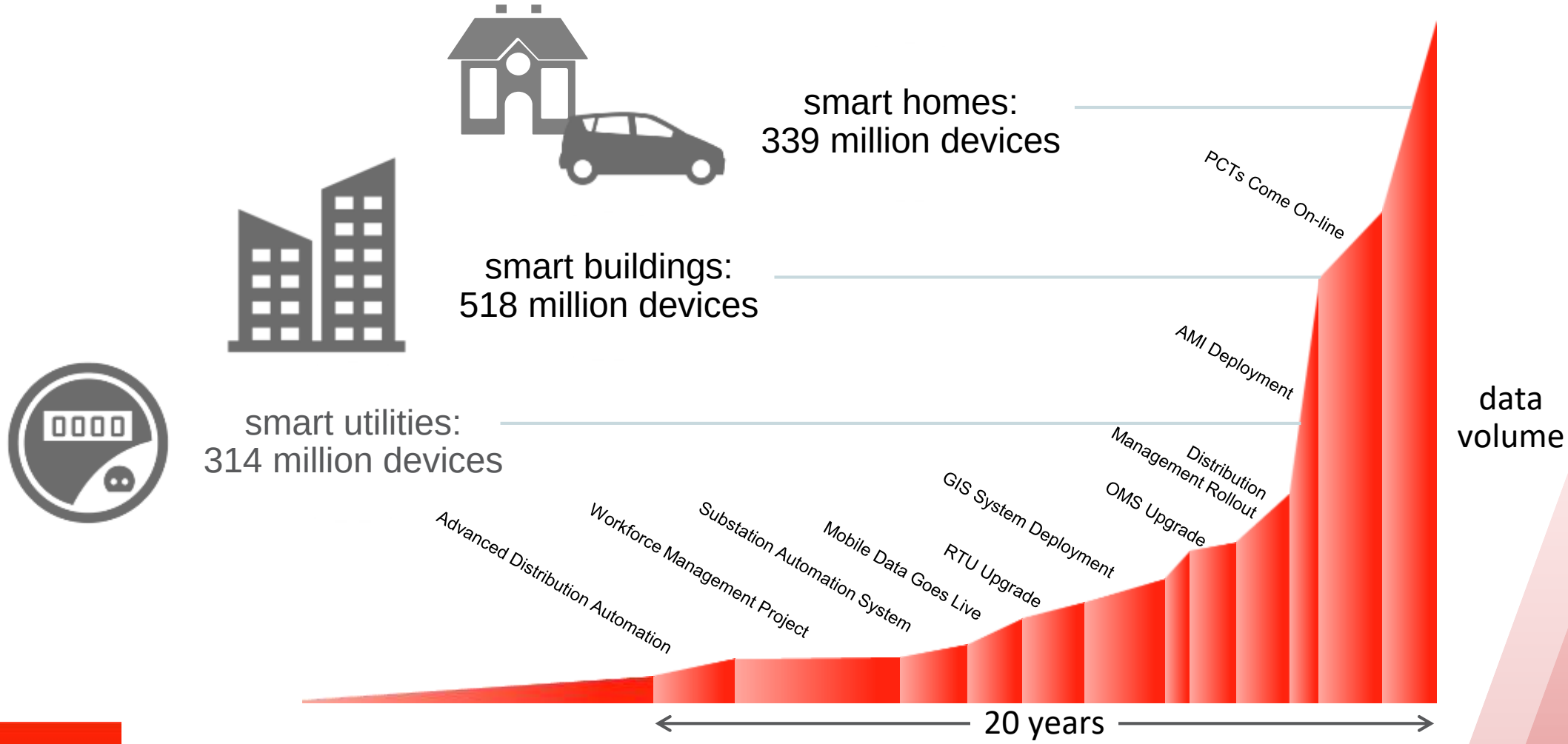
# Smart Grid permite a las utilities ver las cosas como nunca antes.



# LA INDUSTRIA ESTA CAMBIANDO

MOBILE • AUTOMATED • DATA-DRIVEN • CONNECTED

- Más de 1.000 millones de medidores smart para el 2020
- Evolución de la tecnologías móviles
- Expansión de Smart grid
- Hogar conectado
- Expectativas de interacciones omnicanal

## LA DIGITALIZACIÓN ESTA TRANSFORMANDO EL NEGOCIO

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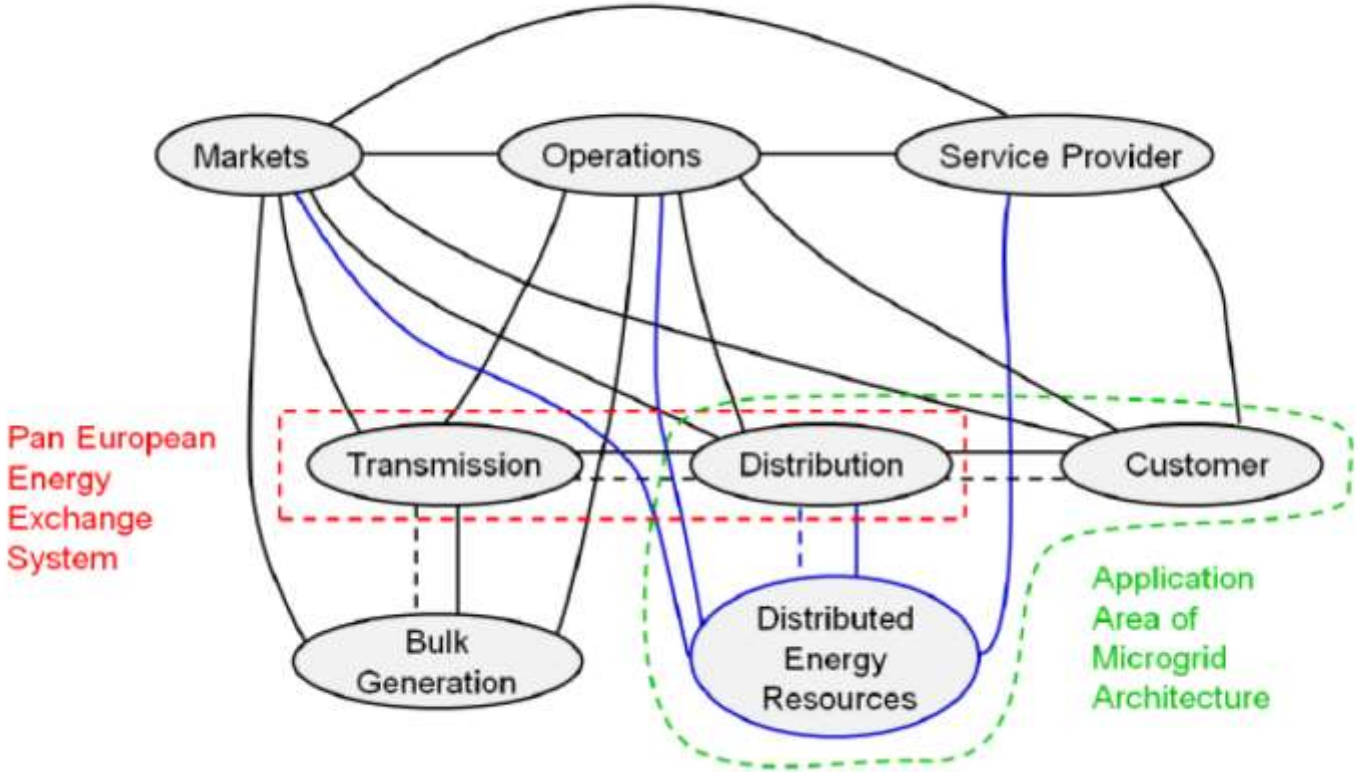
# La Paradoja de las Utilities

**Requiere Agilidad**

**Requiere Confiabilidad**

# Smart Grid - Modelo Conceptual NIST



# Modelo Europeo de Arquitectura Smart Grid

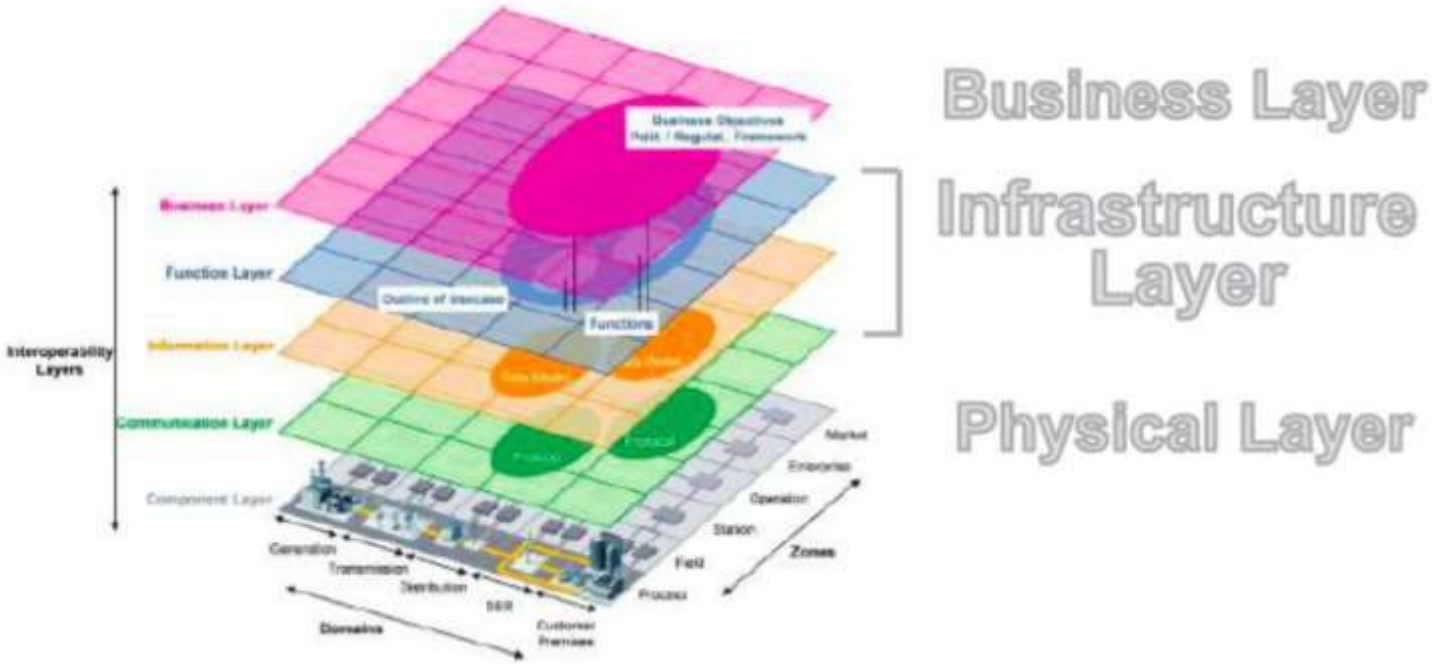



Figure 3: Layers in the Energy System

**Source: "Digitalization of the Electricity System and Customer Participation" description and recommendations of Technologies, Use Cases and Cybersecurity" ETIP SNET - WG4**

# Habilitando la Digitalización

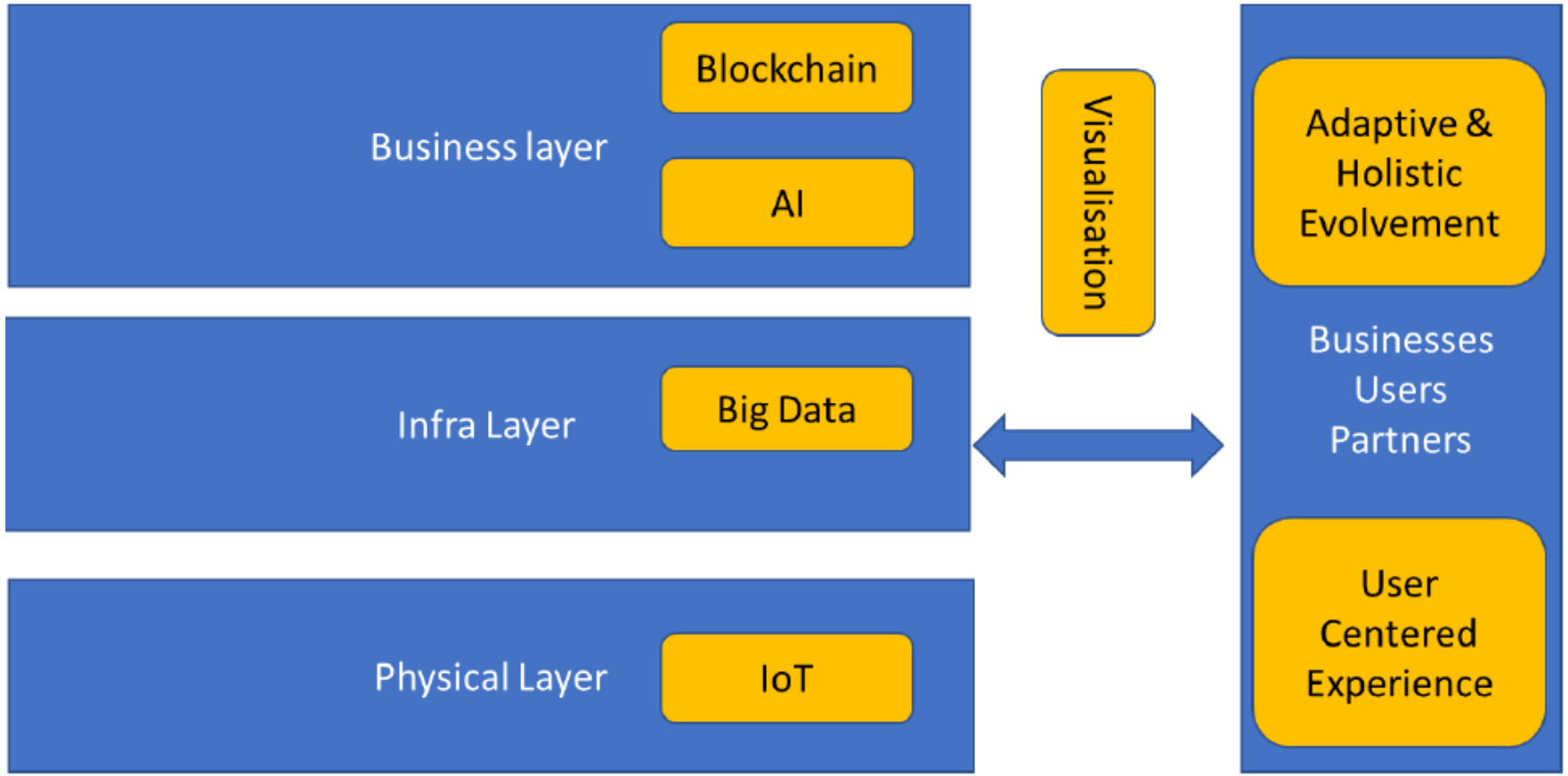
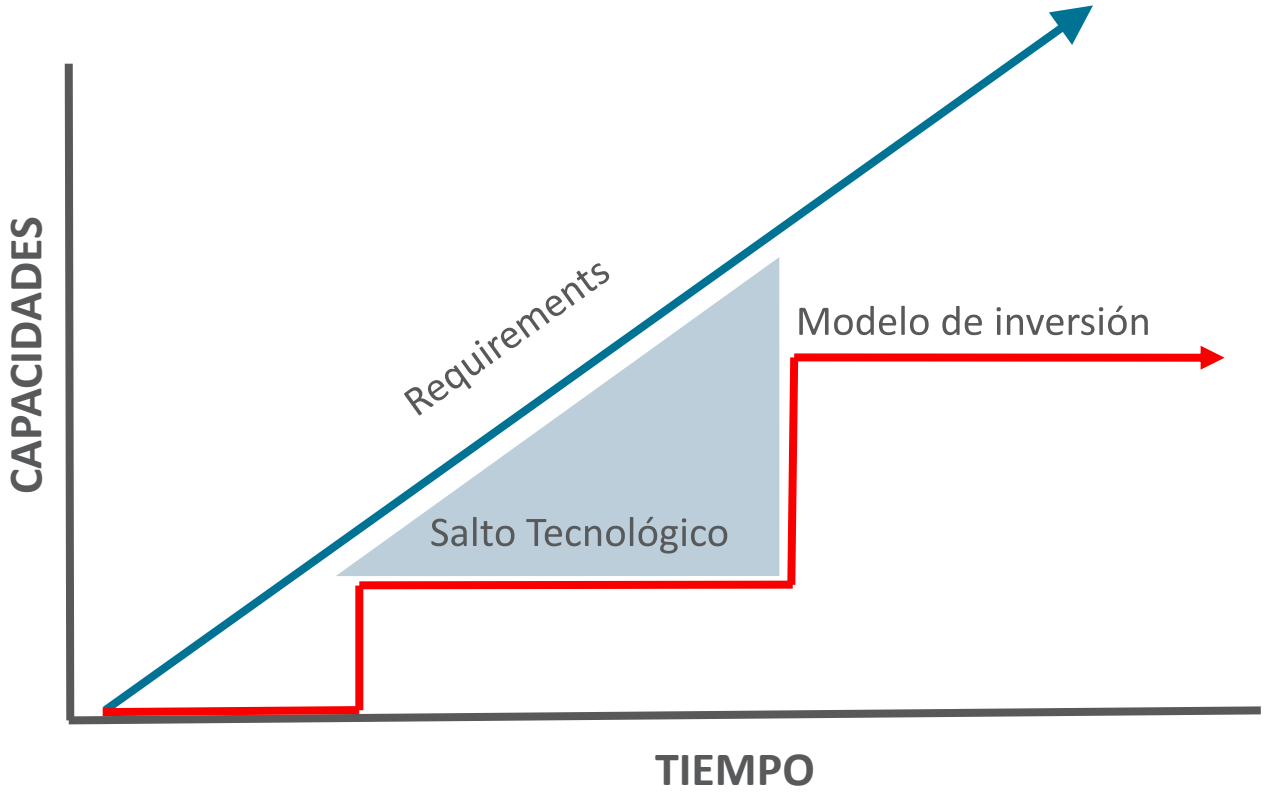



Figure 16: Main Digitalization Trends and Disruptive Technologies of the Energy System

**Source: "Digitalization of the Electricity System and Customer Participation" description and recommendations of Technologies, Use Cases and Cybersecurity" ETIP SNET - WG4**

# MODELOS DE INVERSIÓN TRADICIONAL
## LEAVE UTILITIES BEHIND




**$3.8 Trillion**

**Gasto Global IT**

**75%** Gasto en mantenimiento, integración, y tareas rutinarias

**sólo**

**25%** Invierte en innovación

# Innovación Dual.

## Fortalecer el negocio principal mientras se potencia la agilidad futura

# UTILITIES NECESTIAN MÁS DE LO QUE LOS SISTEMAS LEGADOS PUEDEN ENTREGAR

| DESDE | A |
| --- | --- |
| RÍGIDOS | FLEXIBLES |
| INFORMACIÓN DE CLIENTE | EXPERIENCIA DE CLIENTE |
| TRANSACCIONALES | RELACIONALES |
| STATUS QUO | INNOVACIÓN |
| COMPLEJIDAD IT | AGILIDAD EN EL NEGOCIO |

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**92%**

De los clientes estarian satisfechos si su proveedor de energía pudiera personalizar toda la experiencia de usuario.

# UTILITIES DIGITAL

## BUSCAN OPORTUNIDADES EN LA DIGITALIZACIÓN

**ATRAER** y conocer fielmente y con detalle los clientes.

**CREAR VALOR** de los datos y de las tecnologías de smart grid extendido.

**HABILITAR LA INNOVACIÓN** con sistemas simplificados construidos para cargas misionales y con entrega de servicios ágiles.

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**APLICACIONES AGILES**
Modulares e Iterativas

**CORE STACK**
Confiable y escalable

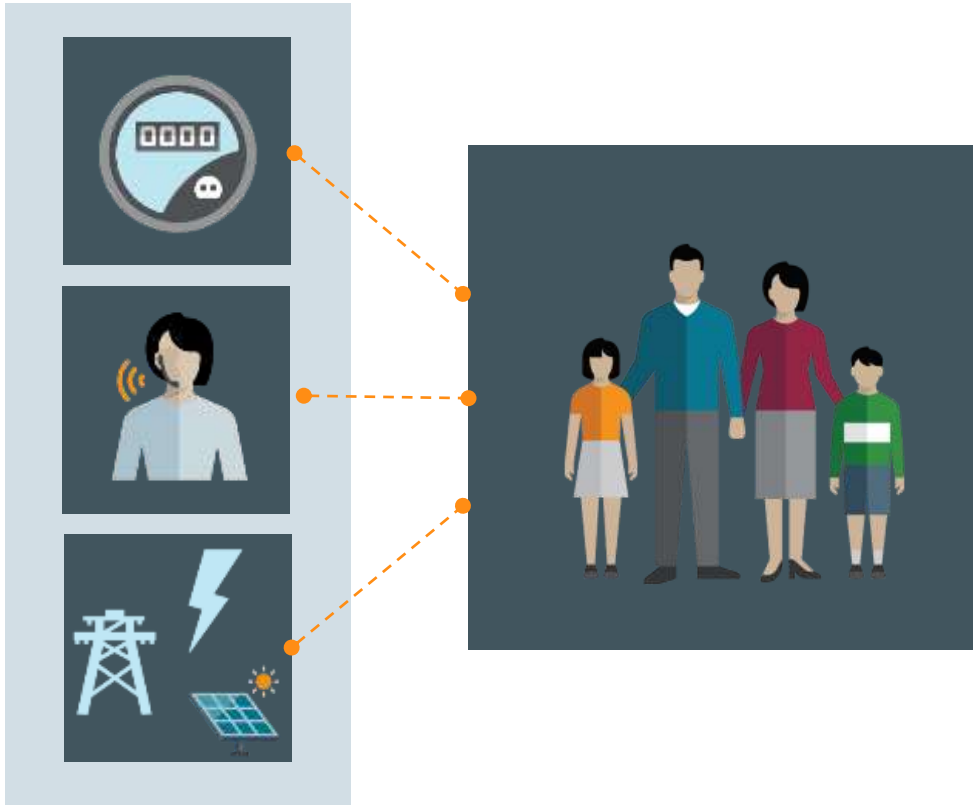
**INFRASTRUCTURA**

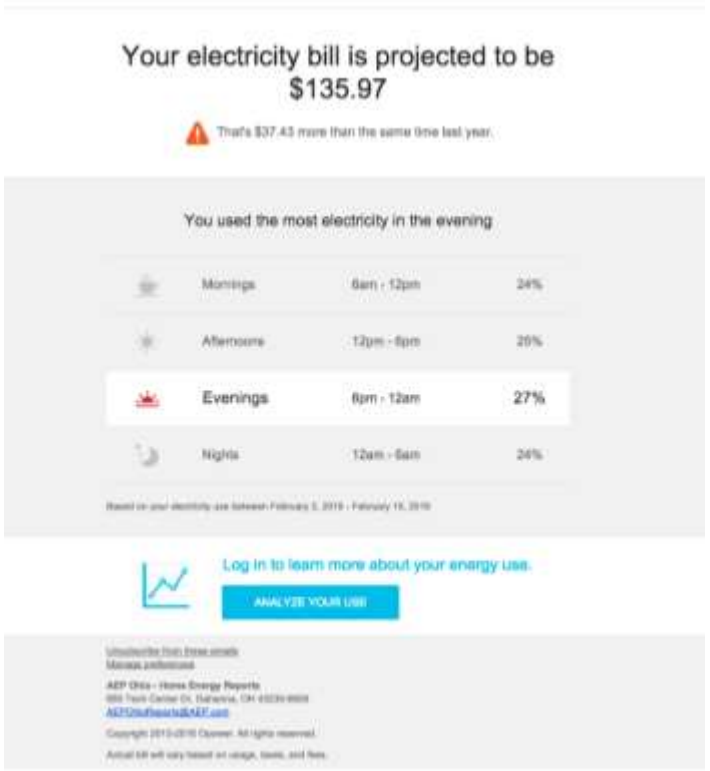
## Data y Analítica

## Cliente-Centric Grid

## Experiencia de Cliente

# Empodere sus clientes con una experiencia unificada, clara y con información consistente





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# 80%

De los CIOs ubican la estrategia de **Advanced Analytics** como una de las 3 tecnologías que potencialmente pueden cambiar su negocio en los próximos 5 años.

*Source: 2017 CIO Agenda: A Utility Perspective*

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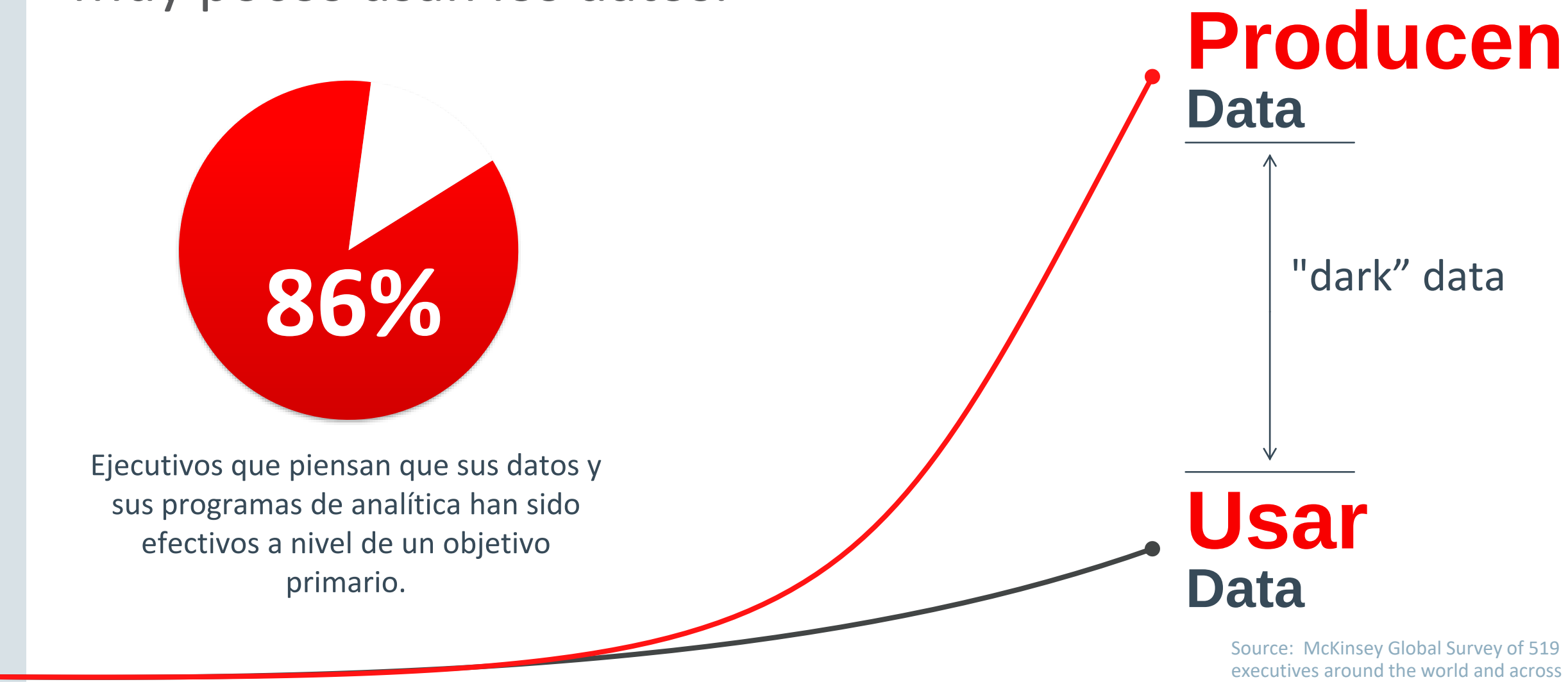
# Muy pocos usan los datos.




Ejecutivos que piensan que sus datos y sus programas de analítica han sido efectivos a nivel de un objetivo primario.




Source: McKinsey Global Survey of 519 executives around the world and across industries in September 2015

Research by McKinsey&Company. September 2015 Global Survey. http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-need-to-lead-in-data-and-analytics

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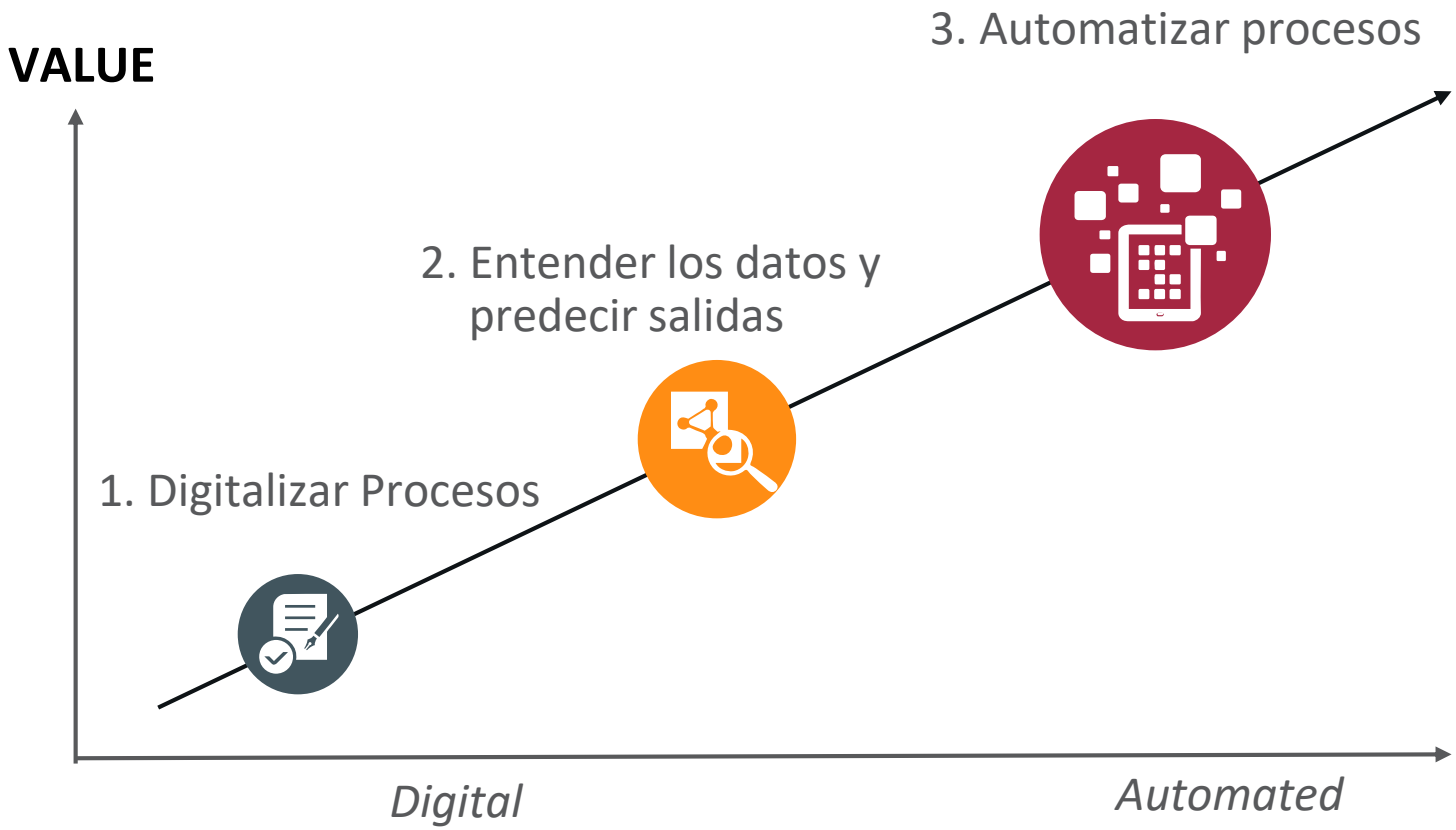
# ¿Cual es la siguiente fase de transformación digital para las Utilities?

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# ¿Cómo lo implemento?

On-Premise

Public Cloud

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# Optimice Hoy, Planifique el Mañana

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# La nube de Oracle

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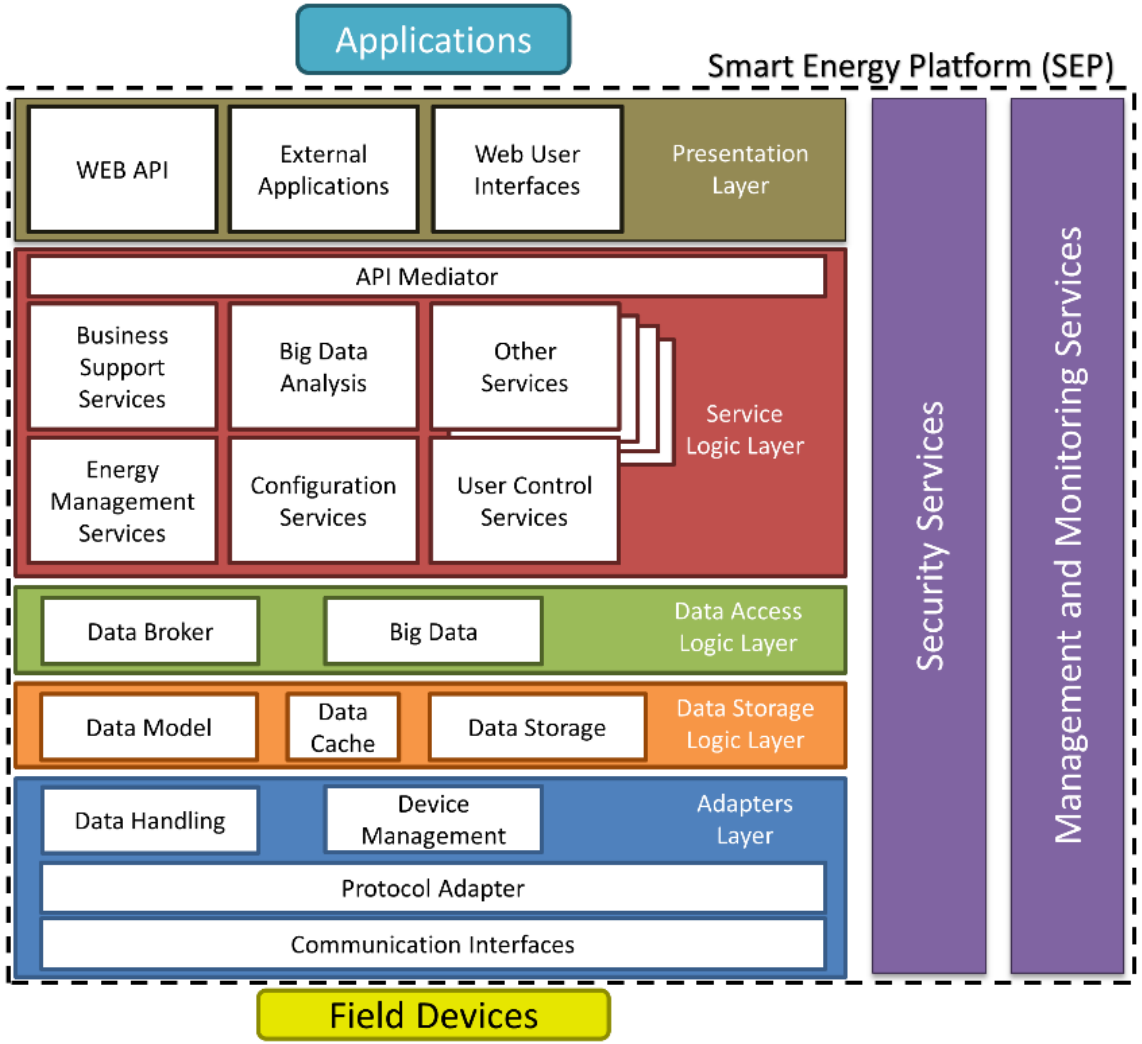
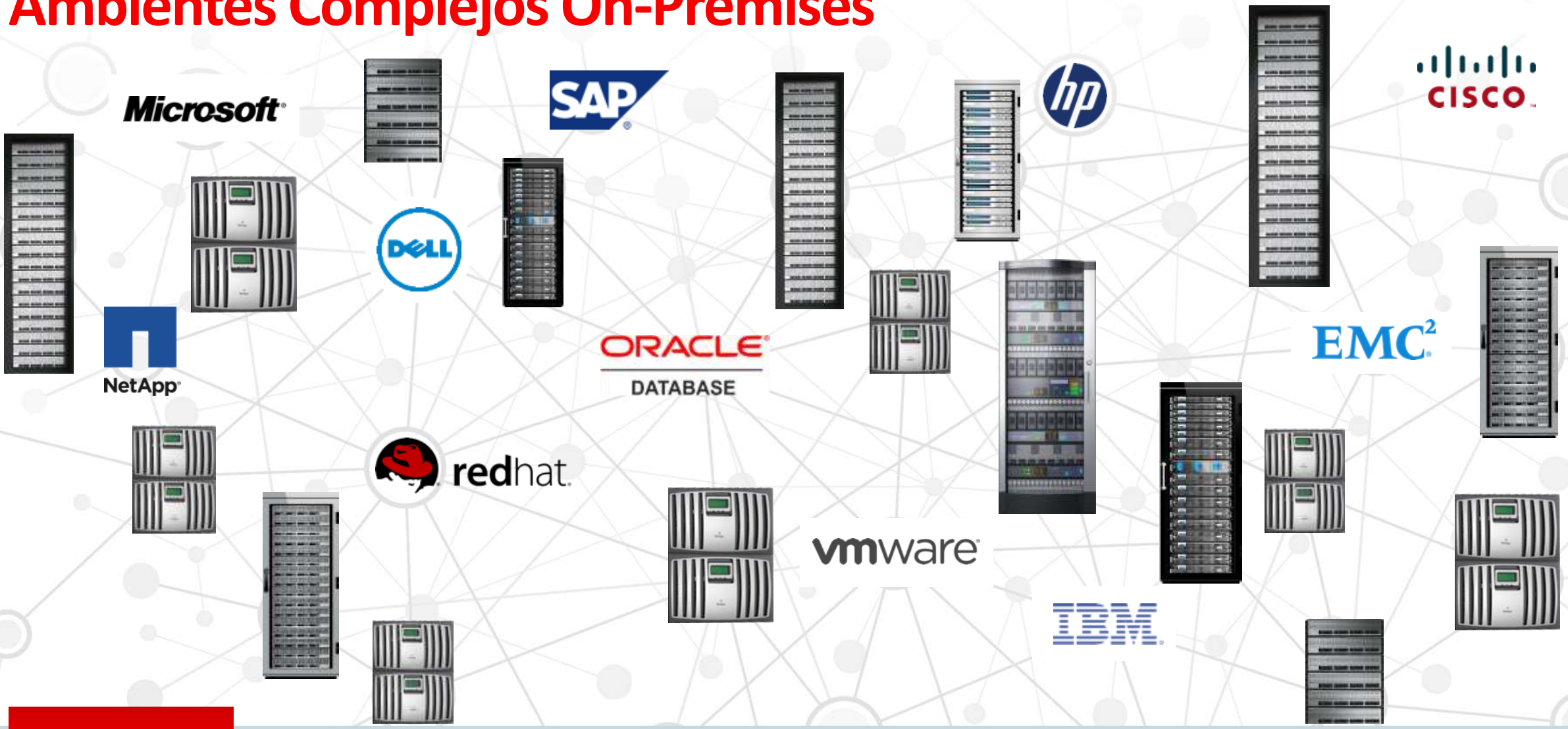
# Arquitectura de Referencia – Cloud Privado




Source: "Digitalization of the Electricity System and Customer Participation" description and recommendations of Technologies, Use Cases and Cybersecurity" ETIP SNET - WG4

# DataCenter Legados
## Ambientes Complejos On-Premises

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# Oracle Database Appliance

el

# LUGAR

para ejecutar Oracle Database

## Cuesta menos, es Simple, es Seguro

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# ¿ Y la Inteligencia Artificial?

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# Inteligencia artificial

La habilidad de los sistemas de computo para realizer tareas que normalmente requieren inteligencia humana.

# machine learning

Una rama de la IA focalizada en el aprendizaje y mejora de la toma de decisiones.
**Muy relevante para las empresas.**

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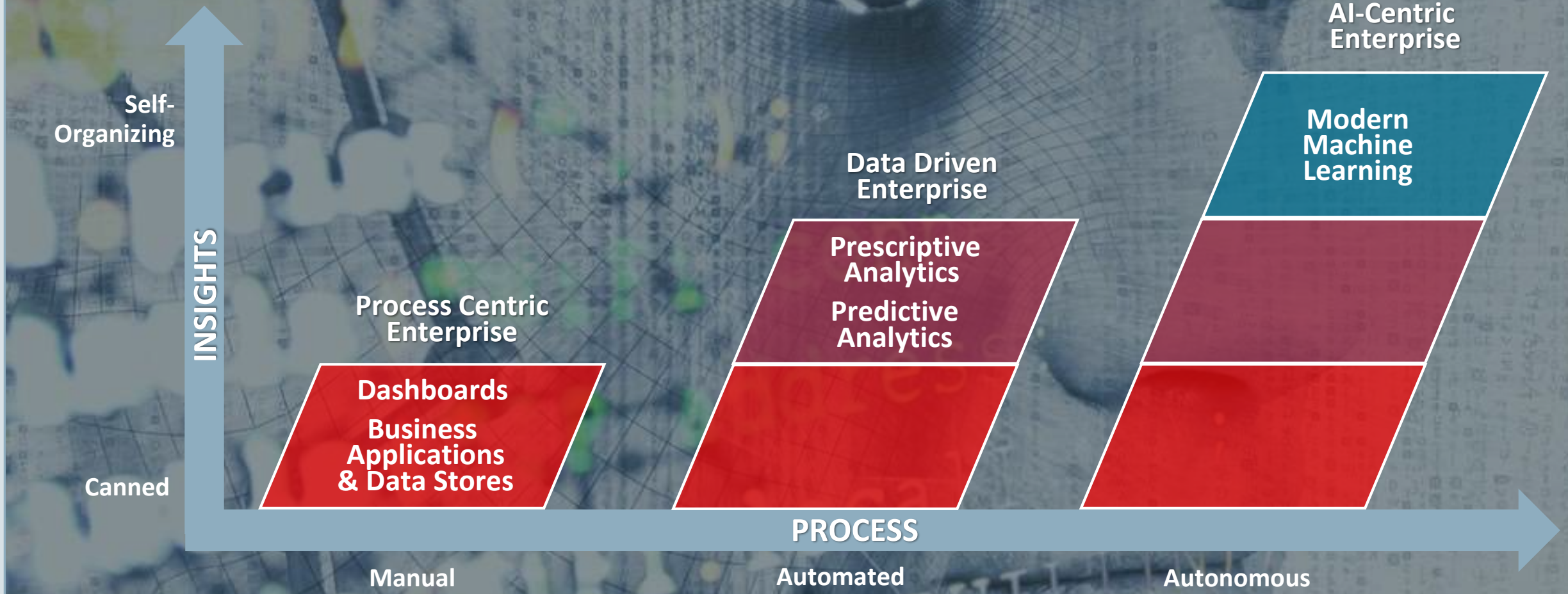
# Machine Learning la siguiente fase del camino Empresarial de Datos

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# Machine Learning y los Datos Empresariales

Usando datos históricos para construir mejores predicciones y recomendaciones

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# Oracle Database: In-Database Machine Learning

- Amplia gama de algoritmos y modelos con la opción de Oracle Advanced Analytics.
- Construcción de modelos flexibles
  - SQL, R or Python
  - Oracle Data Miner
  - SQL Developer
- Los modelos de machine learning y los algoritmos se ejectuan dentro de la base de datos Oracle, No afuera.
- Ejecución en Paralelo.
- Los datos se mantienen en un sólo lugar

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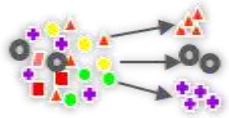
# Oracle's Machine Learning & Adv. Analytics Algorithms

## Classification

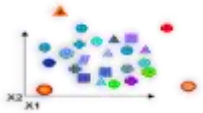
- Naïve Bayes
- Logistic Regression (GLM)
- Decision Tree
- Random Forest
- Neural Network
- Support Vector Machine
- Explicit Semantic Analysis

## Clustering



- Hierarchical K-Means
- Hierarchical O-Cluster
- Expectation Maximization (EM)

## Anomaly Detection

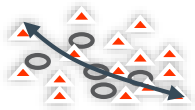


- One-Class SVM

## Time Series

- State of the art forecasting using Exponential Smoothing.
- Includes all popular models e.g. Holt-Winters with trends, seasons, irregularity, missing data

## Regression

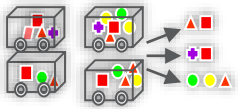


- Linear Model
- Generalized Linear Model
- Support Vector Machine (SVM)
- Stepwise Linear regression
- Neural Network
- LASSO

## Attribute Importance

- Minimum Description Length
- Principal Comp Analysis (PCA)
- Unsupervised Pair-wise KL Div
- CUR decomposition for row & AI

## Association Rules



- A priori/ market basket

## Predictive Queries

- Predict, cluster, detect, features

## SQL Analytics

- SQL Windows, SQL Patterns, SQL Aggregates

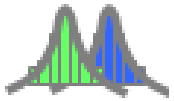
## Feature Extraction

- Principal Comp Analysis (PCA)
- Non-negative Matrix Factorization
- Singular Value Decomposition (SVD)
- Explicit Semantic Analysis (ESA)

## Text Mining Support

- Algorithms support text type
- Tokenization and theme extraction
- Explicit Semantic Analysis (ESA) for document similarity

## Statistical Functions



- Basic statistics: min, max, median, stdev, t-test, F-test, Pearson's, Chi-Sq, ANOVA, etc.

## R Packages

- CRAN R Algorithm Packages through Embedded R Execution
- Spark MLlib algorithm integration

## Exportable ML Models

- REST APIs for deployment

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- OAA (Oracle Data Mining + Oracle R Enterprise) and ORAAH combined
- OAA includes support for Partitioned Models, Transactional, Unstructured, Geo-spatial, Graph data. etc,

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## Data Integration

## Data Lake

## Database

## Visualization

ETL Tools

Informatica

alteryx

BI Tools

Qlik

tableau

looker

MicroStrategy

SQL

Advanced Analytics

sas

NGDATA

R

Digital Reasoning

rocana


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# Oracle Big Data Appliance

- Construído y optimizado para Big Data
- Co-desarrollado con Cloudera
- Facilita la implementación, la operación y el crecimiento
- Mejorado con Software de Oracle de manera opcional
- Alto desempeño y mas economico que construir una solución de Big Data a mano.
- Equivalente en Nube Pública

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# 51 Cosas que no necesita hacer con Big Data Appliance

**Architect**

1. Determine what services run in which locations
2. Design automated failover strategy at all levels
3. Design security approach
4. Design network approach including network switches needed
5. Determine optimized server configuration
6. Determine exact versions to use for BIOS, drive firmware, network cards
7. Design high-throughput integration with current enterprise relational systems
8. Design growth strategy

**Acquire**

9. Purchase hardware
10. Contract for annual support of operating system
11. Contract for annual support of Hadoop
12. Contract for annual support of hardware
13. Contract for annual support for R

**Install (one or more clusters)**

14. Rack up the servers
15. Setup network switches
16. Cable the servers
17. Install optimal firmware versions for BIOS, drives, and network cards
18. Setup RAID to for O/S , configuration data
19. Install the O/S
20. Setup all the IPs, including administration networks, virtual IPs for failover, etc.
21. Validate network timings
22. Setup SSH connectivity
23. Setup tuned O/S parameters to support heavy I/O and heavy network workloads
24. Install MySQL metadata database and configure for failover
25. Install CDH and Cloudera Manager
26. Install the Oracle Big Data Connectors
27. Install Oracle Big Data SQL
28. Test the installation for each node of cluster
29. Certify cluster with SAS and other third party products

**Secure**

30. Install/Configure disk encryption
31. Install/Configure network encryption
32. Install/Configure Sentry
33. Install supporting Kerberos infrastructure, enable Kerberos, and configure for failover
34. Install/Configure Audit Vault collector

**Patch & Upgrade**

35. Assess multi-level patching dependencies
36. Write scripts to automate patching of multiple nodes from a single command
37. Determine when it is necessary to upgrade HW firmware
38. Assess O/S upgrade schedule without disruption existing Hadoop installation
39. Write scripts to add new features

**Grow**

40. Design how to reallocate/balance services appropriately as you add servers and racks
41. Design how to expand/scale/setup the networking appropriately as you add servers and rack

**Service**

42. Setup Automated Failover of the critical HW and SW components
43. Install/Configure Automatic Service Request
44. Install/Configure Enterprise Manager plug-in
45. Resolving hardware issues
46. Worry about server failure
47. Worry about disruptive disk failures

**Renew (annually)**

48. Renew contract for annual support with operating system vendor
49. Renew contract for annual support with hardware vendor
50. Renew contract for annual support with Hadoop distribution vendor
51. Renew contract for annual support with R support vendor

# Analítica Avanzada, Monitoreo y Visualización agrega valor

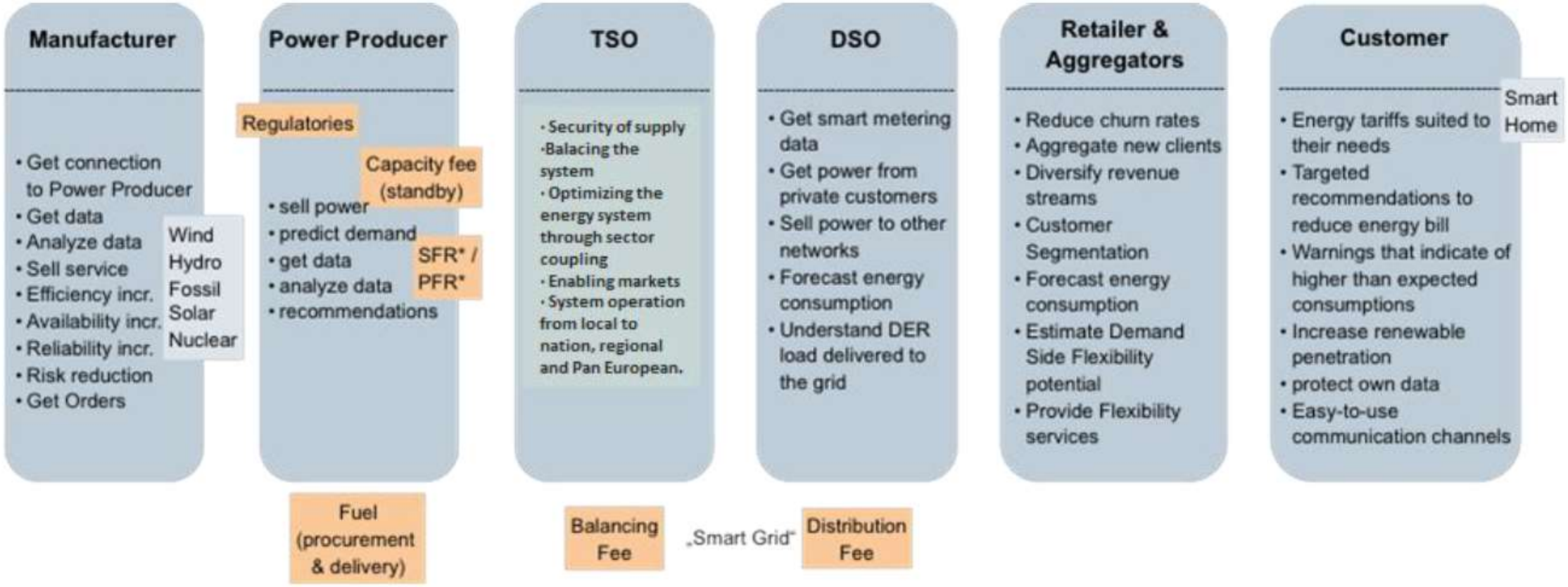


Figure 20: Potential areas profiting of monitoring, visualisation, and analytics in the energy value chain

**Source: "Digitalization of the Electricity System and Customer Participation" description and recommendations of Technologies, Use Cases and Cybersecurity" ETIP SNET - WG4**


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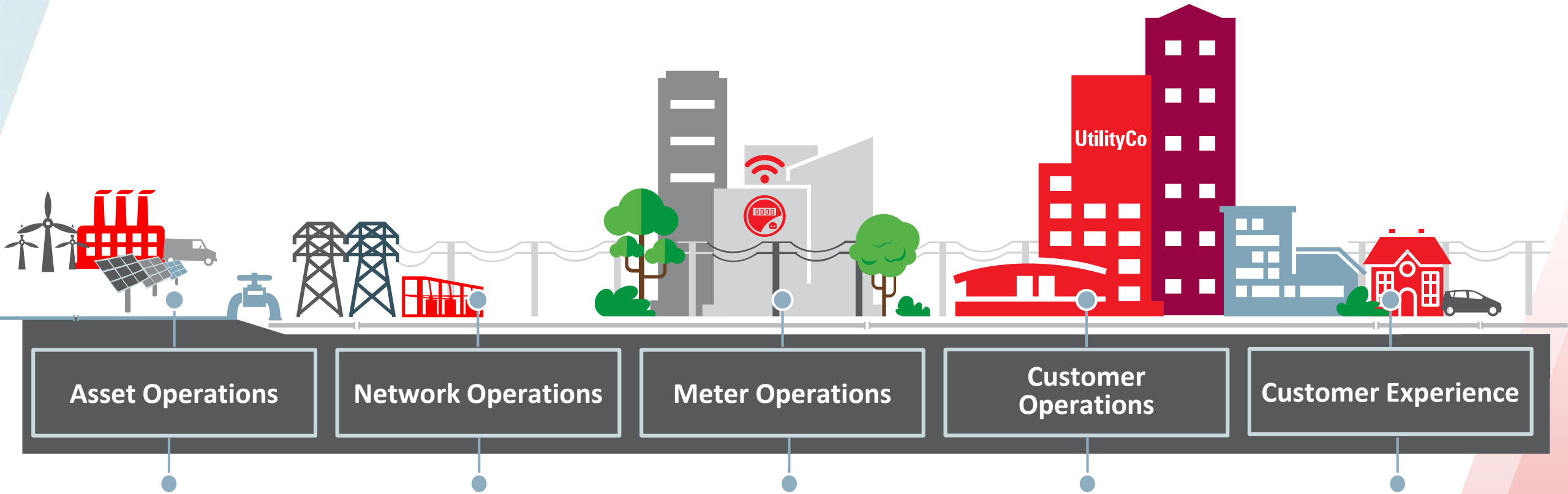
# Analítica en cada Dominio




Analisís Predictivo de activos

Machine learning para ejecutar el grid en determinada capacidad

Mejora de los pronósticos con análisis inteligente de la demanda

Simular cambio en los ingresos con nuevas estructuras

Seleccionar los clientes que problamente adoptarían DER

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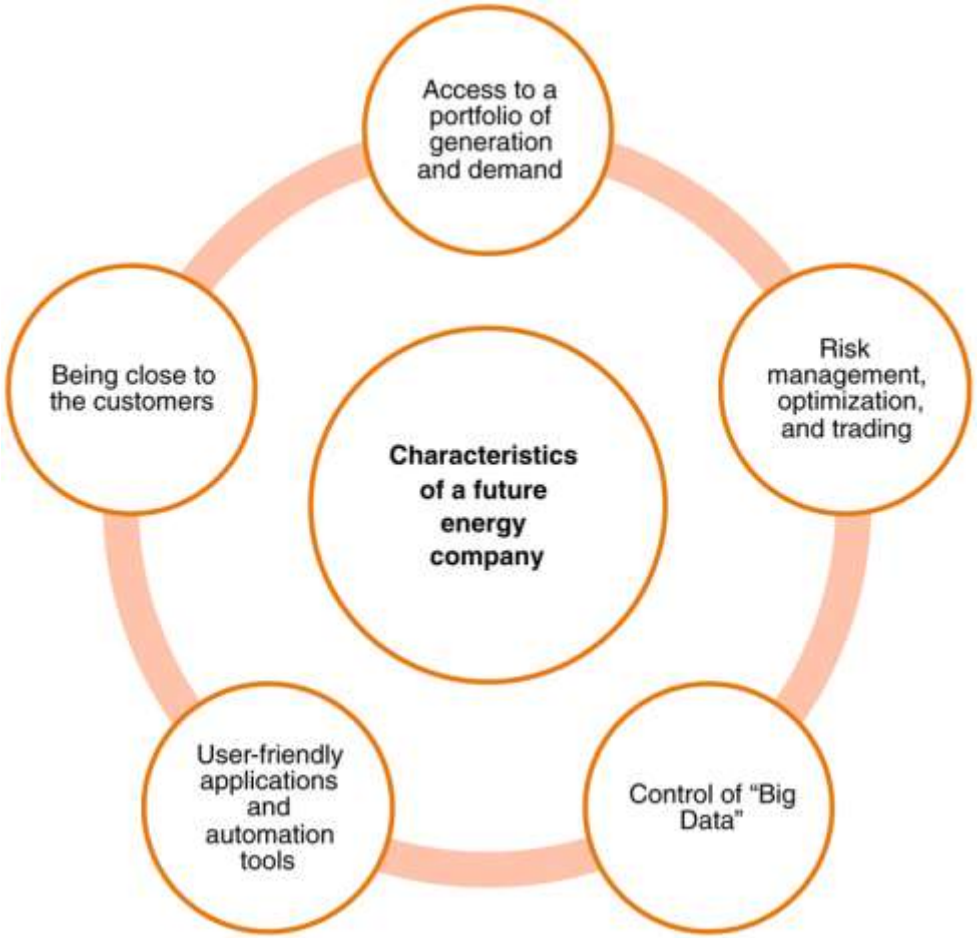
# La Compañía de Energía del Futuro




Source: Simon Bradbury Pöyry Management Consulting, Oxford, United Kingdom

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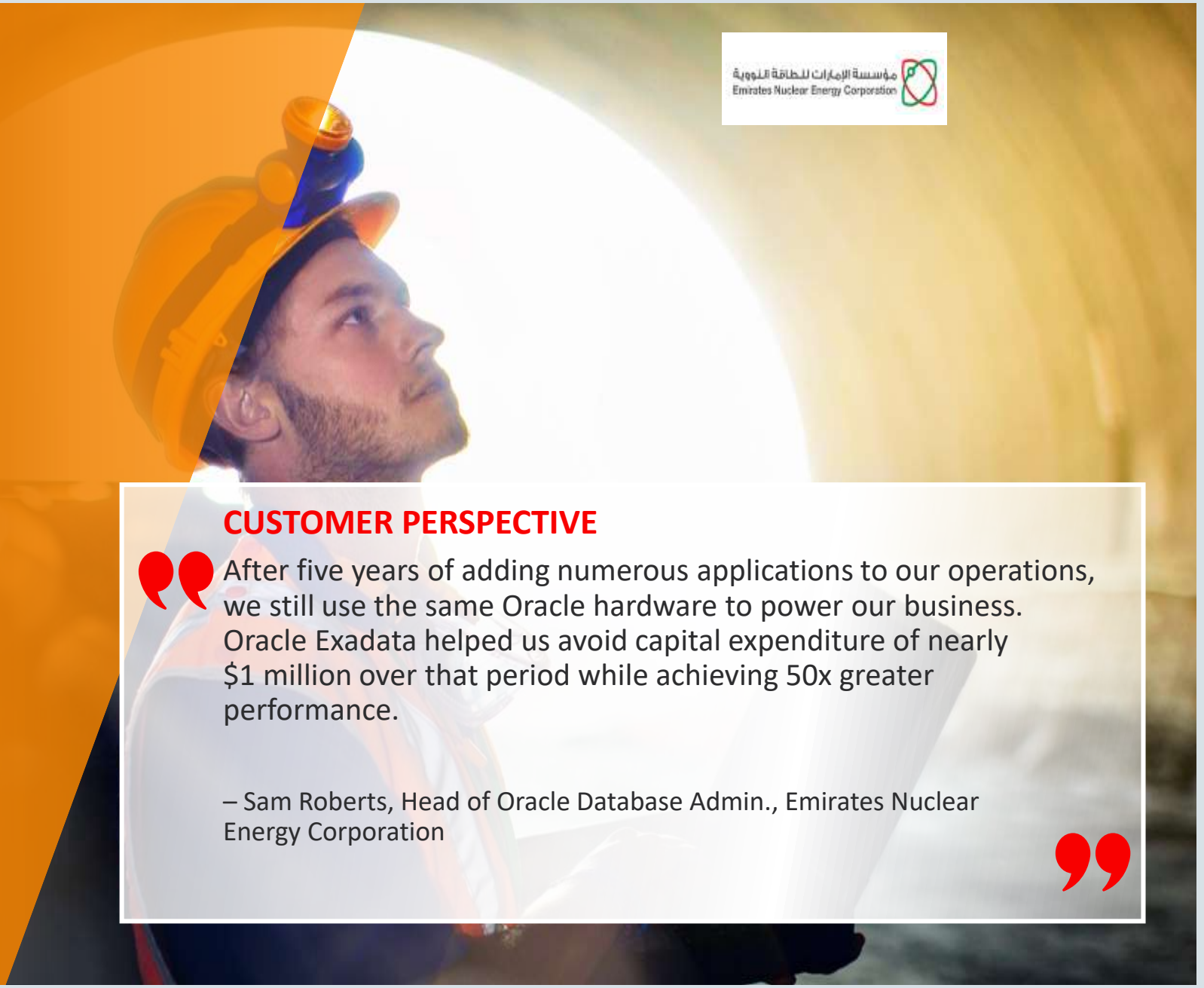
# Energy Company Makes Smarter Decisions While Achieving Rapid ROI



Saved capital expenditure of nearly **$1M**

Increased mission-critical performance by **50X**

**9X**
more employees and 1.5X more databases

## CUSTOMER PERSPECTIVE

"After five years of adding numerous applications to our operations, we still use the same Oracle hardware to power our business. Oracle Exadata helped us avoid capital expenditure of nearly $1 million over that period while achieving 50x greater performance."

– Sam Roberts, Head of Oracle Database Admin., Emirates Nuclear Energy Corporation

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# Norway's Third Largest Energy Company Turns Up Performance, Availability with ODA

**CUSTOMER PERSPECTIVE**

Oracle Engineered Systems is the most suitable platform for our off-the-shelf-applications which rely entirely on Oracle Database. The capacity-on-demand licensing allows us to pursue projects as demanded by the business without paying unnecessary infrastructure costs.

*— Bjarne Karlsen, CTO, Agder Energi AS*

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# Oil & Gas Company Improves Performance, Aligns Spend with Business Growth

**3x**
performance improvement

**Ensures**
greater system efficiencies

**50%**
reduction in processing time of critical applications

## CUSTOMER PERSPECTIVE

"We have improved our overall performance 3x by using Oracle Database Appliance. We were able to solve all our problems including those of performance, memory constraints, hardware and software compatibility, backup downtime, and user complaints."

— Eslam Kamel, Database Administrator, General Petroleum Company (EMEA, Egypt)

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# AIM Gets High Availability Database Solution on Cost-Effective Consolidation Platform

**40%**
faster processing of bills and invoices

**80%**
less admin time

**Simple**
and fast installation and deployment

## CUSTOMER PERSPECTIVE

We started our analysis by comparing an all-in-one solution against a mix of best-of-breed components. Once we had decided for all-in-one—with a single point of contact for technical support—we went straight to Oracle Database Appliance, because we run several Oracle Databases and wanted to maintain this advantage with a machine optimized for their use. Also, Oracle Database Appliance perfectly matched our core business needs, and offered great ease of installation and short deployment time.

– Stefano Cominato, Director ICT Services, Aziende Industriali Municipali Vicenza S.p.A. (EMEA, Italy)

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# Large Public Electric Utility Company Powers Up with ODA

**Enhanced**
data security

**Higher**
database performance

**5x**
decreased processing and reporting time

## CUSTOMER PERSPECTIVE

With all our Oracle Databases running on Oracle Database Appliances, we have substantially increased our ability to compete in the electricity market. Applications and queries run faster, data is always available and secure and we have much better control of our multi-terabyte infrastructure.

– Selma Kovačević, ICT Solutions Architect, JP Elektroprivreda BiH d.d.

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