Deloitte.

NEXT GENERATION TELCO ARCHITECTURE

How to bridge the gap with Over-the-top (OTT) internet providers and survive in the digital age

March 2017

INTRODUCTION

The advent of the digital age is disrupting the Telco industry.

Traditional telecommunications companies are losing revenues as the competition from Over-the-top (OTT) internet providers grows.

Telco business units are demanding new services and products from their IT departments. Services must be brought to the market more quickly and cost-effectively.

The industry is reacting. All major Telco players are making huge investments in their Business Support Systems and Operational Support Systems (BSS/OSS) as they try to tackle lack of automation, redundant functions and rigidity. And yet there remains a risk that they are underestimating the extent of the disruption they face and the need for a quantum leap in their entire IT model.

The objective of this paper is to focus the attention of IT executives on the need for a deeper change in IT architecture. The adoption of new technologies and the development of new capabilities risks being unsuccessful unless the way in which IT applications are implemented is changed.

This paper presents a vision of a possible future Telco architecture based on an "API Fabric" model that relies on microservices, "softwarized" infrastructures, and big data capabilities. These architectural paradigms are currently one of the key enablers of digital companies' expansion and could be used to create an IT Telco architecture capable of ensuring resilience and flexibility.

The paper describes why this new architectural model will support business needs and defines a possible high level transition towards it.
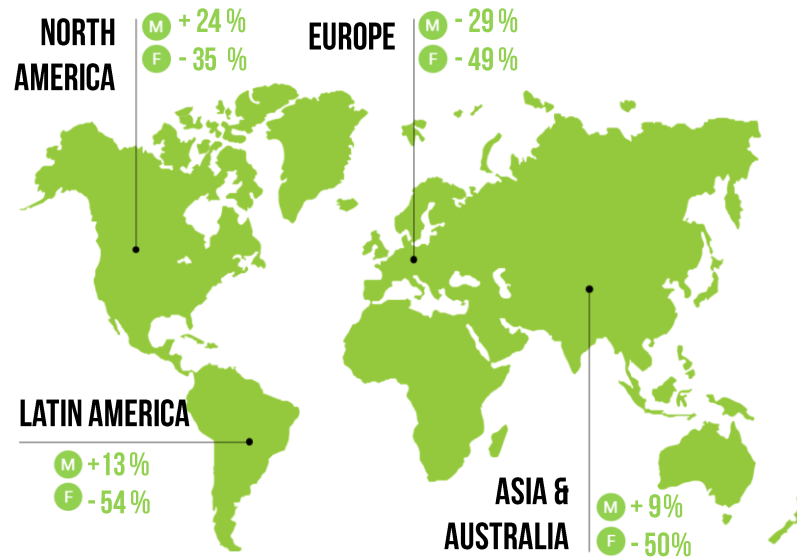
We hope you will find this paper of interest and that the vision presented enables you to develop your IT architecture strategy.

CONTENT OVERVIEW

How to bridge the gap with OTTs and survive in the digital age

Ⓜ Change in mobile revenues 2011-2016
Ⓕ Change in fixed line revenues 2011-2016

NORTH AMERICA
Ⓜ + 24 %
Ⓕ - 35 %

EUROPE
Ⓜ - 29 %
Ⓕ - 49 %

LATIN AMERICA
Ⓜ +13 %
Ⓕ - 54 %

ASIA & AUSTRALIA
Ⓜ + 9 %
Ⓕ - 50 %

1. THE DISRUPTED TELCO BUSINESS MODEL

Consumers are demanding high quality telecommunications services and data consumption is growing exponentially. To try to compete Telco operators have made huge investments in networks, customer care and new offerings. Despite this they are facing a general decline in revenues (especially in Europe), while competition from OTTs is growing. To survive, Telcos have started to create additional revenue streams from new digital services: the Internet of Things (IoT), mobile payments, on-demand TV, e-health, cloud services, etc. In the next five years, the Telco business model is likely to shift to a "Digital Services Provider" model, whereby telecommunication services will no longer be the core business but instead a means of providing a new digital offering.

2. IMPACTS AND CURRENT CONSTRAINTS

The evolution of the Telco business model means new applications, data and infrastructure are being demanded from IT. Telcos' current IT architectures are the result of multiple merger & acquisition processes, previous waves of new technology and big efforts to integrate systems under severe time pressure. All this has been to the detriment of architectural consistency and has lacked an overall architectural vision. Current IT architectures are therefore quite inadequate to support today's business needs, let alone meet the needs of tomorrow, in terms of flexibility, rapidity and cost-effectiveness.

3. BSS/OSS INITIATIVES — AND THEIR LIMITATIONS

Operators are undertaking big IT initiatives to evolve their BSS/OSS ecosystems. The main areas being tackled are fixed/mobile convergence, service configurability, reduction in functional redundancies, and the creation of new customer engagement capabilities.

Although these BSS/OSS initiatives will lead to a higher level of flexibility and effectiveness, **IT will not be able to support the new business environment without a change in the architectural pattern and a shift in the entire IT model** that goes beyond technological change. The problem is not only identifying what kind of functional evolutions are needed, but also how to evolve the IT ecosystem into an open, flexible and cost-effective model capable of quickly adapting to new business needs and easily integrating innovative solutions.

CURRENT ARCHITECTURE	TARGET ARCHITECTURE
Rigid	Flexible
Closed	Open
Expensive	Cost-effective
Slow	Fast
Complex	Standardized

4. AN ARCHITECTURAL VISION: THE BSS/OSS API FABRIC

An IT reference model that Telco operators could adopt is the one developed by OTTs. Native digital players are able to provide reliable services to a huge number of users and implement innovations in parallel at a very fast rate. To achieve this OTTs have developed new IT paradigms based on the wide use of microservice architectures, application programming interfaces (APIs), big data and cloud platforms.

Adapting these paradigms to the Telco IT environment implies breaking down current monolithic applications into smaller, modular services to maximise responsiveness, resilience, flexibility, interoperability, reuse, and openness.

API

API

BSS/OSS microservices

SaaS solutions
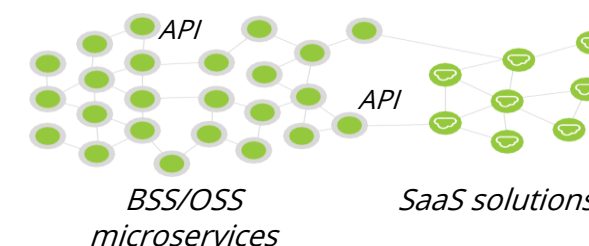
5. A POSSIBLE MIGRATION STRATEGY

Evolution towards the BSS/OSS API Fabric architecture has a wide impact on the entire IT ecosystem: its technologies, processes, organisation and people.

A smooth transition is the most suitable strategy. A big-bang approach could be too risky and complex.

The migration strategy begins with the introduction of software-based infrastructures – Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS) – as tools to develop and integrate the microservices of new applications with the development and operations (DevOps) approach.

Once the organisation reaches a good understanding of the new model, IT can start to migrate legacy applications to the new environment.

6. HOW DELOITTE CAN HELP

Deloitte is recognized as a global leader in IT Consulting and Services and is able to offer unique assistance thanks to its independence, business vision and knowledge of architectural models and trends. Deloitte's professionals can provide a variety of tailored services, covering all organisational needs and requirements, from IT strategy & architecture to vertical implementation.
Deloitte is currently supporting all major Telco operators and has been involved in a large number of complex IT transformation initiatives worldwide.

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A POSSIBLE SOLUTION: THE BSS/OSS API FABRIC

By adapting new architectural paradigms to the Telco context, a possible target architecture can be drawn up: the BSS/OSS API Fabric architecture

KEY FEATURES | OVERALL PICTURE | CORE ELEMENTS | DATA TIER | BIG DATA LAYER | XASS PLATFORMS

The "BSS/OSS API fabric architecture" is a responsive, resilient and open ecosystem of services that interact through standard APIs.

This architecture enables a high level of flexibility and speed through wide adoption of the microservice paradigm.

The architecture will be open to external partners and communities of developers, enabling new services and new business models (both on and off site).

The entire development process leverages IaaS and PaaS capabilities to reduce drastically the time and cost of delivery and of software development.

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TELCO BUSINESS MODEL DISRUPTION

Consumers are demanding high quality telecommunications services and data consumption is growing exponentially. To compete and win new clients, Telco operators have made huge investments in networks, customer care and new offerings.

Despite these efforts, Telco operators are facing a general decline in revenues (especially in Europe), while competition from OTTs is growing.
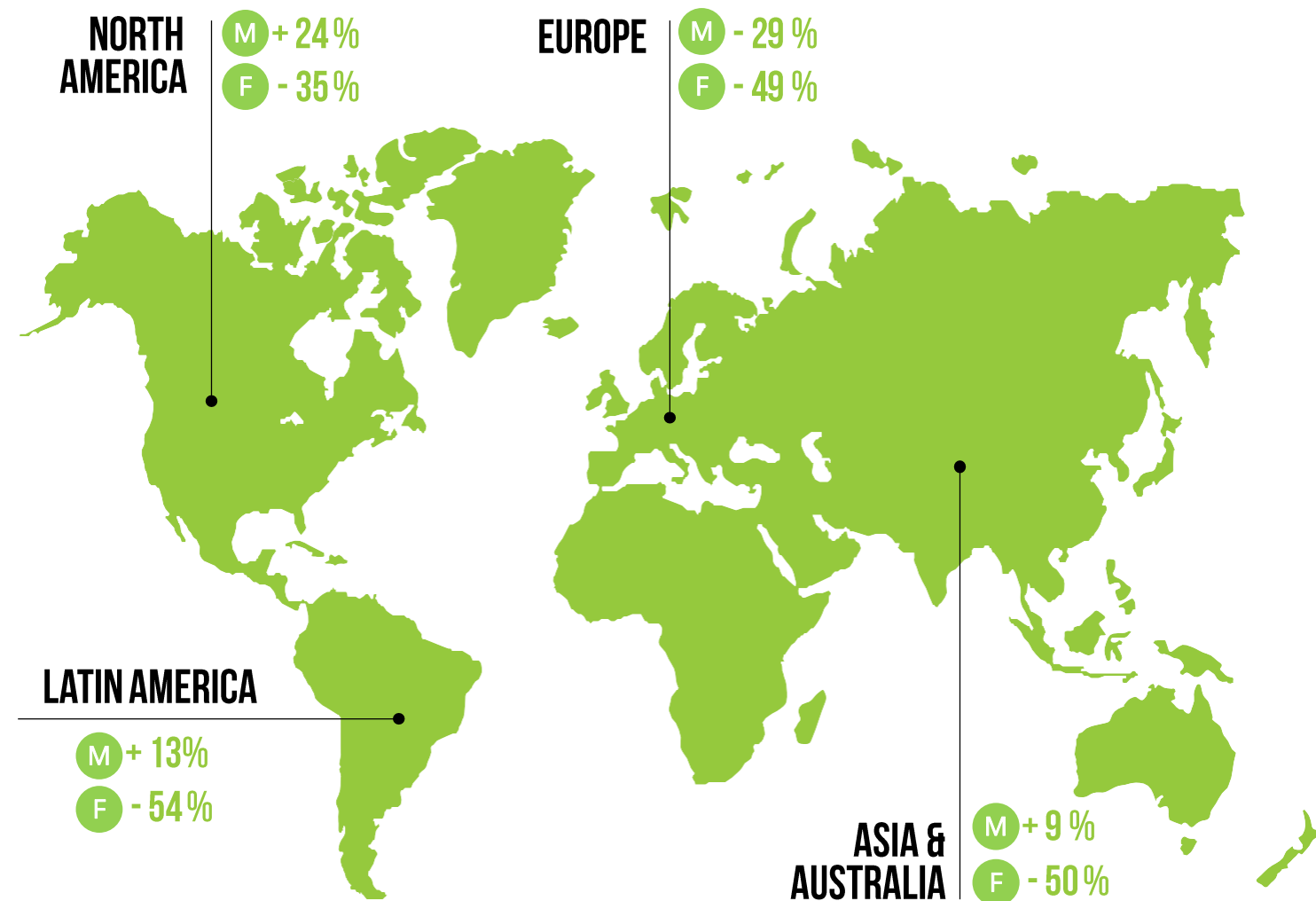
To survive, Telco operators have started to create additional revenue streams, such as new digital services (IoT, mobile payments, on- demand TV, e-health, cloud services, etc.).

In the next five years, Telcos are likely to shift towards a "Digital Services Provider" model, whereby telecommunications services will no longer be the core business but a means of providing a new digital offering.

BUSINESS MODEL DISRUPTION: MARKET CONTRACTION

Operators are facing revenue stagnation, while OTT competition is growing

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- M + 24 %
- F - 35 %

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ASIA & AUSTRALIA
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- F - 50 %

M Change in mobile revenues 2011-2016

F Change in fixed line revenues 2011-2016

Source: Economist Intelligence Unit

The global telecommunications industry continues to record an increase in both connections and traffic, but **Telco revenues are falling.**

GOOGLE FIBER

Google is developing its own fibre infrastructure in the US. Currently, Google Fiber covers about 20 large cities across different states, offering a 1,000 Mbit/s connection and a TV service.

WHATSAPP

WhatsApp (owned by Facebook) has more than 700 million users across the world. The voice-calling feature (introduced in 2015) has the potential to affect mobile voice revenues.

Moreover, **competition from OTTs is growing**: new communications services are **eroding Telco operators' revenues**, and OTT service providers are increasing their investment in telecommunications solutions.

MICROSOFT WI-FI

Microsoft is working to increase its Skype Wi-Fi network. The target is to reach 10 million hotspots across 130 countries, in order to enable Microsoft apps (not only Skype) to connect free through Wi-Fi networks.

FACEBOOK HOTSPOT

Facebook has reached an agreement with Netgear that will allow stores and small and medium-sized enterprises which use the Netgear router to offer their clients free access to the web.

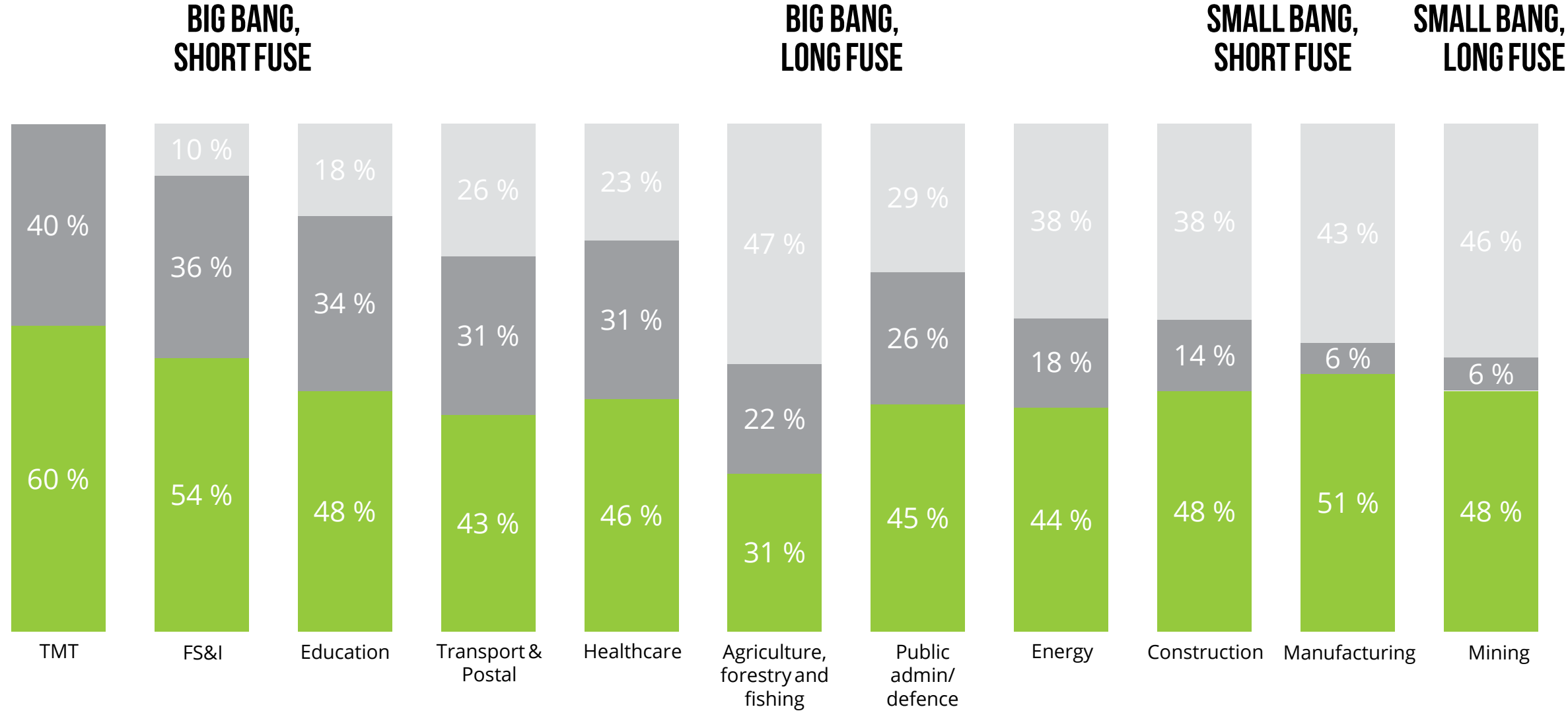# BUSINESS MODEL DISRUPTION: DIGITAL TRANSFORMATION

At the same time, digital transformation will disrupt the TMT industry

Although the Telco industry has already been reshaped by digital innovations, the digital potential is higher than in other industries.

Emerging digital technologies and significant changes in customer behaviour will disrupt Telco sectors (along with Media and Technology).

- Current use of digital technologies
- Additional digital disruption
- Non-digital core

BIG BANG, SHORT FUSE

	TMT	FS&I	Education	Transport & Postal	Healthcare
Non-digital core		10 %	18 %	26 %	23 %
Additional digital disruption	40 %	36 %	34 %	31 %	31 %
Current use of digital technologies	60 %	54 %	48 %	43 %	46 %

BIG BANG, LONG FUSE

	Agriculture, forestry and fishing	Public admin/ defence	Energy
Non-digital core	47 %	29 %	38 %
Additional digital disruption	22 %	26 %	18 %
Current use of digital technologies	31 %	45 %	44 %

SMALL BANG, SHORT FUSE

	Construction	Manufacturing
Non-digital core	38 %	43 %
Additional digital disruption	14 %	6 %
Current use of digital technologies	48 %	51 %

SMALL BANG, LONG FUSE

	Mining
Non-digital core	46 %
Additional digital disruption	6 %
Current use of digital technologies	48 %

Source: : "Digital Disruption - Short Fuse, Big Bang?", Deloitte, 2014

BUSINESS MODEL DISRUPTION: BUSINESS REQUIREMENTS

Operators are recognising that the only way to prosper is to ride the digital transformation wave

To seize the opportunities resulting from digital transformation, operators are creating new digital services, building capabilities that enable an effective engagement of digital customers and starting to leverage the huge amount of data collected every day to improve service quality and produce new valuable services.

REQUIREMENT 1

CREATE NEW REVENUE STREAMS FROM DIGITAL SERVICES

Telco operators are **adding digital services to their portfolio**, with **huge investments** in the **development of digital capabilities**.
Operators are using a mixed strategy including both in-house development and third-party partnerships.

REQUIREMENT 2

EFFECTIVE ENGAGEMENT OF DIGITAL CUSTOMERS

Operators are building **tailored engagement approaches** to respond to the needs of **digital customers**. The most common initiatives include Omni-Channel strategy, Service Quality improvement, Service Provisioning time reduction and tailored services.

REQUIREMENT 3

UNLOCK DATA VALUE

Operators produce, collect and manage a huge amount of customer data every day. The value of this data is largely unexploited. An effective analysis of customer data along with network data can dramatically improve both internal processes and external services.

In addition, any analysis conducted, can help identify previously unapparent product opportunities.

BUSINESS MODEL DISRUPTION: BUSINESS REQUIREMENTS

Operators are recognising that the only way to prosper is to ride the digital transformation wave

Digital services markets are growing exponentially. The increasing demand for content and the growing number of connected devices generated by IoT (and related services) will dramatically increase the volume of data and the number of accounts, generating a direct business opportunity for Telco operators.

Despite this, most revenues will be generated by service consumption. Operators are recognizing that in order to exploit fully the opportunities resulting from digital services, they have to become digital players and build a comprehensive digital services portfolio.

FAST GROWING DIGITAL MARKETS

IoT

IoT market will be $14.4T by 2022 (1)

IP-TV

+23% CAGR for VOD Services (2)

CLOUD SERVICES

$216B by 2020 (3)

WEARABLES

+80% CAGR (4)

MOBILE IDENTITY

$+9,5% CAGR (5)

INDUSTRY 4.0

100B connections by 2025 (6)

MOBILE PAYMENT

+37% CAGR (7)

CONNECTED CAR

250M connected vehicles (8)

(1) Source: Roundup Of Internet of Things Forecasts And Market Estimates, Forbes, 2016
(2) Source: Global VOD Market 2015-2019, Technavio, 2015
(3) Source: Gartner Says by 2020 "Cloud Shift" Will Affect More Than $1 Trillion in IT Spending, Gartner, 2016
(4) Source: Global Wearable Electronics Market 2015-2019, Technavio, 2015
(5) Source: Global Mobile Identity Management Market 2016-2020, Technavio, 2016
(6) Source: Re-booting industry for the digital age, BBC, 2015
(7) Source, Global Mobile Payment Market 2015-2019, Technavio, 2015
(8) Source: Who owns the road?-The IoT connected car of today and tomorrow, Deloitte, 2015

BUSINESS MODEL DISRUPTION: BUSINESS REQUIREMENTS

Operators are recognising that the only way to prosper is to ride the digital transformation wave

Telcos' customer base is rapidly becoming digital. Digital customers behave differently. They expect outstanding service levels, fast activation, self-service functionalities and effective digital channel interactions.

An effective digital customer engagement strategy (and its proper execution) will dramatically impact operators' attractiveness, defining their ability to improve revenues.

TELCO CUSTOMERS ARE CHANGING AND BECOMING MORE…

KNOWLEDGEABLE
They know more about technology, products, services and competition

COLLABORATIVE
OTTs, apps and productivity tools encourage and enable sharing and collaboration

EMPOWERED
They seek out self-service and multi-channel offerings, sales and service experiences

MOBILE
Consumers can shop anywhere, anytime and expect business to engage with them according to their schedule

DEMANDING
Busy consumers have little time and demand convenience and simplicity

INTERACTIVE
Increasing on-line sharing/engagement and real time interaction

BUSINESS MODEL DISRUPTION: BUSINESS REQUIREMENTS

Operators are recognising that the only way to prosper is to ride the digital transformation wave

The volume of data generated by each customer has dramatically increased. Big data technologies offer the possibility to perform massive data analysis in nearly real time. Operators have started to recognize the unexploited possibilities and have implemented solutions capable of extracting business value from data.

The big data wave is just at the beginning of its potential. Operators are seeking to integrate network and business data and build platforms to provide data to external partners as a new revenue stream.

NEW WAYS OF LEVERAGING DATA VALUE:

CX ENHANCEMENT

Dynamic profiling and enhanced customer segmentation; Clickstream analysis; Detailed weblog inquiry

PRECISE MARKETING

Offer optimization; Churn identification; Churn prediction & social network analytics

DATA MONETISATION

Data exposure to external partners using standard APIs

REAL-TIME DECISION-MAKING

Dynamic network congestion control; Data exploration; Location-based services & advertising; Cybercop

OPERATIONAL EFFICIENCY

Preventative customer care; Interactive voice recognition (IVR); Network ROI analysis; Intelligent network planning; Cell-site optimization

IMPACTS ON IT AND CURRENT CONSTRAINTS

The evolution of the Telco business model means more is being demanded from IT in terms of applications, data and infrastructures.

Telcos' current IT architectures are the result of multiple merger & acquisition processes, technological waves and system integration initiatives undertaken under severe time pressure – to the detriment of architectural consistency.

As a result, IT architectures are quite insufficient to support today's business needs, let alone meet the needs of tomorrow, in terms of flexibility, rapidity and cost-effectiveness.

IMPACTS ON IT ARCHITECTURES

The evolution of the Telco business model demands more from IT and will have a deep impact on IT architectures

KEY IT REQUIREMENTS FROM NEW BUSINESS NEEDS

REQUIREMENT 1
APPLICATIONS

- develop new applications and new components rapidly, with cost-effective investments and higher flexibility

- substitute hard-coded business workflows with parametric functionalities

- maximise the reuse of existing applications, avoiding functional redundancy

- architecture must support full interoperability, enabling "plug & play" of new components.

REQUIREMENT 2
DATA

- create effective big data capabilities that integrate the full volume of data produced by BSS/ OSS systems

- ensure data consistency and single point of truth for each data category (customer data, product data…)

- create perspective analytics with the ability to trigger business processes.

- data becomes a core backbone to enable the Digital Business

REQUIREMENT 3
INFRASTRUCTURE

- processing, storage and network capabilities have to be deployed in hours instead of months and have to scale automatically in response to application peaks

- infrastructure-related operating expenses have to be reduced drastically

- infrastructure has to maintain a high level of resilience, automatically responding to incidents or component failures.

CURRENT CONSTRAINTS AND PRESSURE POINTS

Telcos' current IT architectures are not able to satisfy business needs because of their high complexity, lack of flexibility and low level of automation

TELCO IT ARCHITECTURE

Click on "!" to isolate a specific element and display its constraints; click on "Telco IT Architecture" (top left) to go back to the full map

ENTERPRISE SYSTEMS

Enterprise Risk Mgmt
- Revenues Assurance
- Fraud Mgmt

Enterprise Resource Planning
- HR Mgmt
- Finance
- Asset

- Other

INTEGRATION LAYER

(!) CHANNELS

IVR	Apps	MSG	CC
Web	Web	Web	Web

(!) BSS

Fixed Consumer
- CRM
- Billing
- Order Mgmt

Fixed Business
- CRM
- Billing
- Order Mgmt

Mobile Consumer
- CRM
- Billing
- Order Mgmt

Mobile Business
- CRM
- Billing
- Order Mgmt

(!) OSS

Fulfilment	Provisioning	Inventory	NW & Service Assurance	Other

ANALYTICS BIG DATA

Business BI / Big Data
- Centraliz DWH/BI
- Domains Vertical BI

Network BI / Big Data
- Centraliz DWH/BI
- Domains Vertical BI

(!)

SECURITY MGMT

(!) INFRASTRUCTURE

INFRASTRUCTURE	NETWORK

Current IT architectures are the result of multiple merger & acquisition processes and different waves of technology. Core systems have often evolved without paying enough attention to architectural consistency and the overall picture.

This has resulted in a very complex and rigid environment, unable to satisfy fully 'business-as-usual needs' and completely unable to support the ongoing digital transformation.
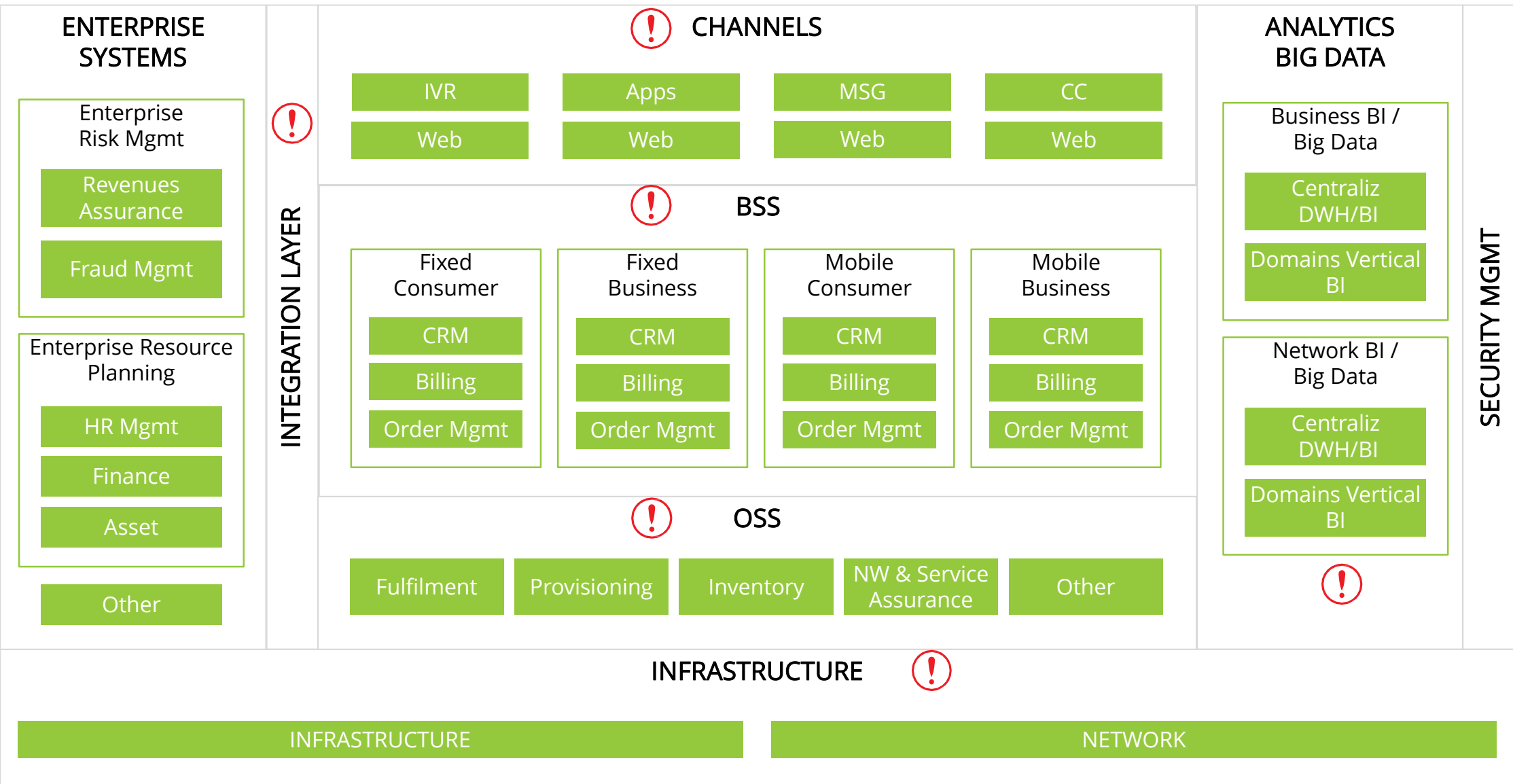
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of their high complexity, lack of flexibility and low level of automation

TELCO IT ARCHITECTURE

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Multiple, non-integrated channels (vertical channel for each business segment and service).

Some services are accessible only through dedicated channels and customer data is not shared between different channels.
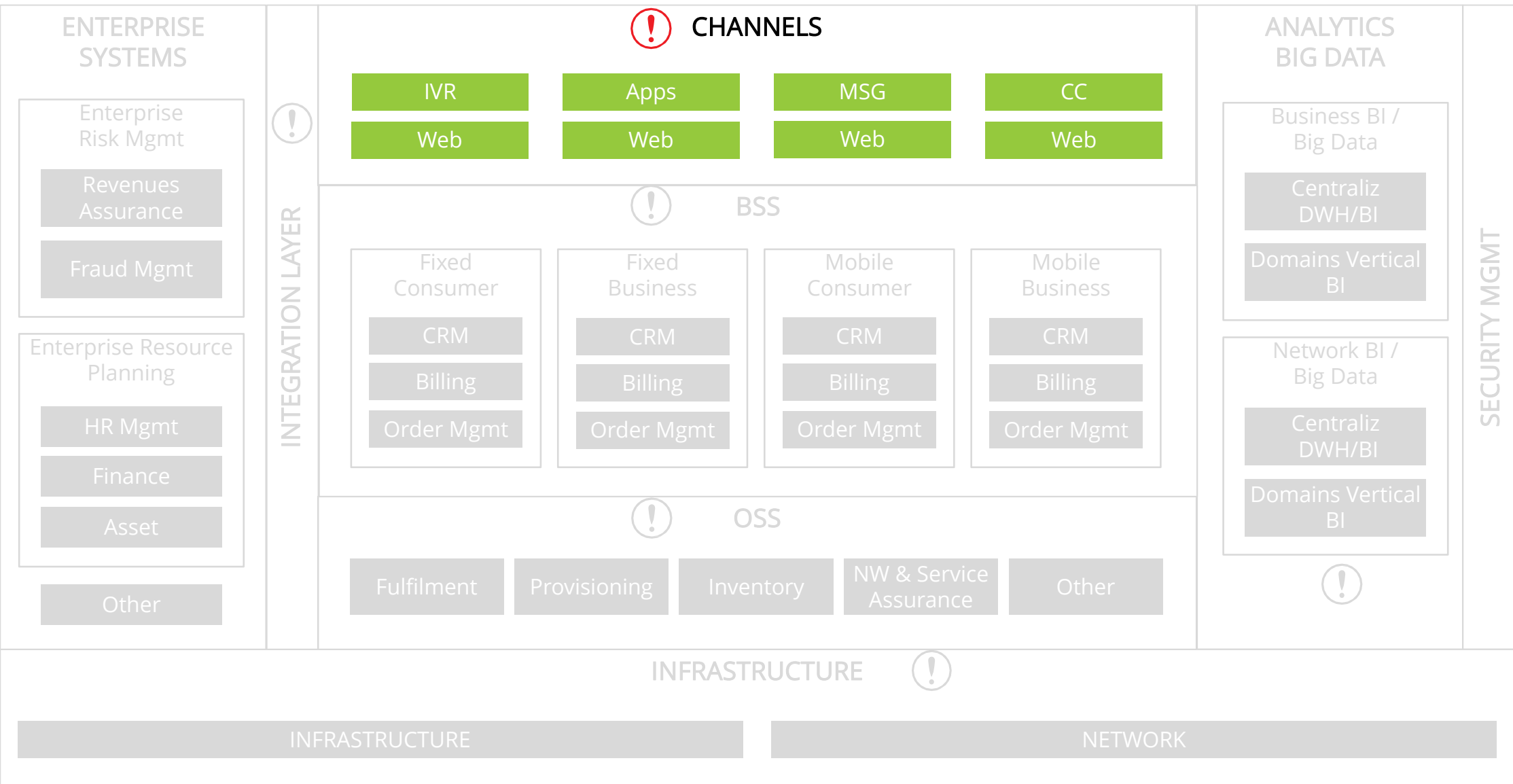
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BSS are fragmented in vertical silos (Consumer/Business and Fixed/Mobile) implemented with heterogeneous, often **obsolete technologies.**

BSS suffer from a lack of flexibility. Changes are expensive to make and take a long time to reach the market. The **use of multiple, not fully integrated product/service catalogues** has a negative impact on automation and service provisioning time.
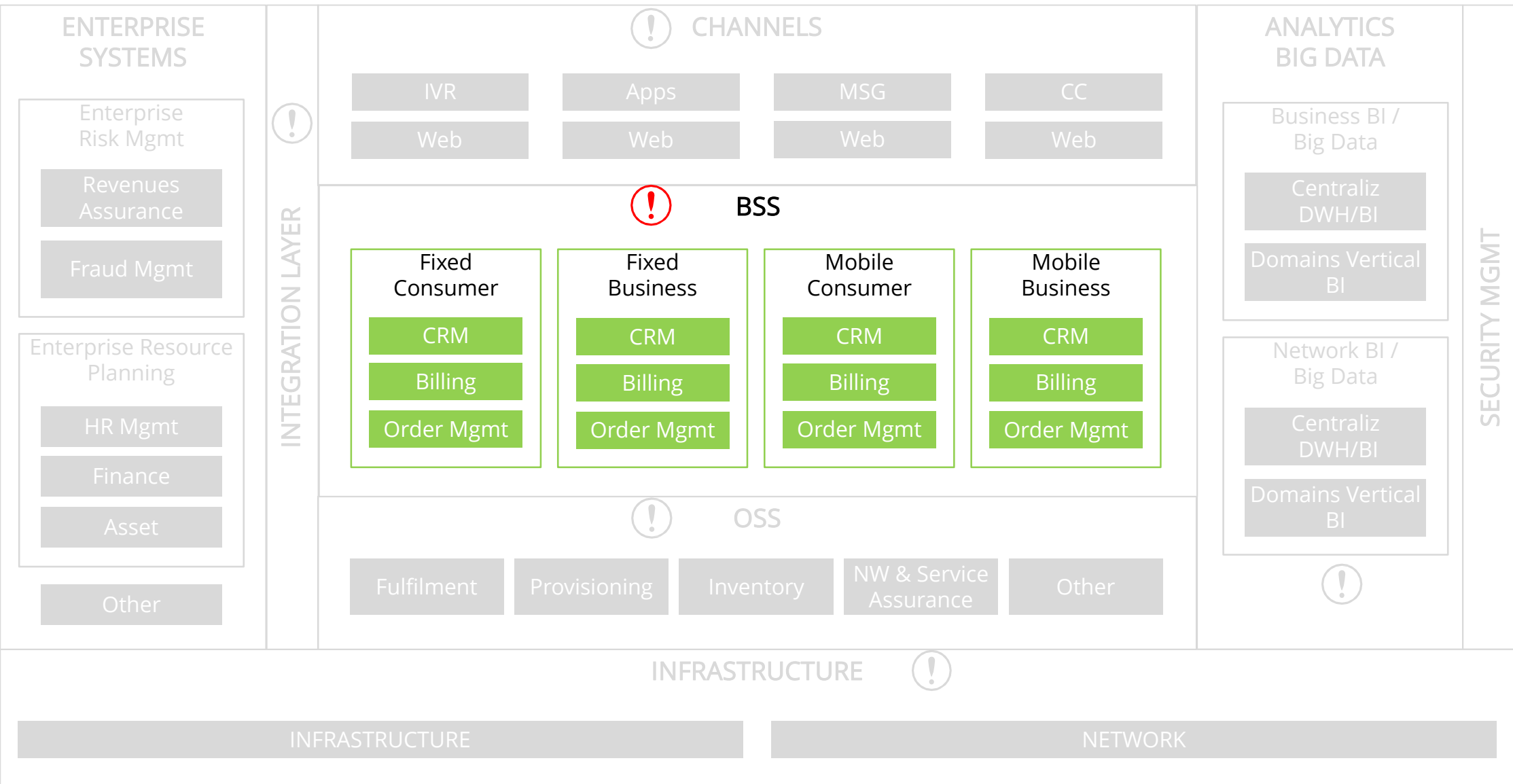
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TELCO IT ARCHITECTURE

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Thousands of integration flows between systems, often based on legacy approaches, produce tightly-coupled architectures.

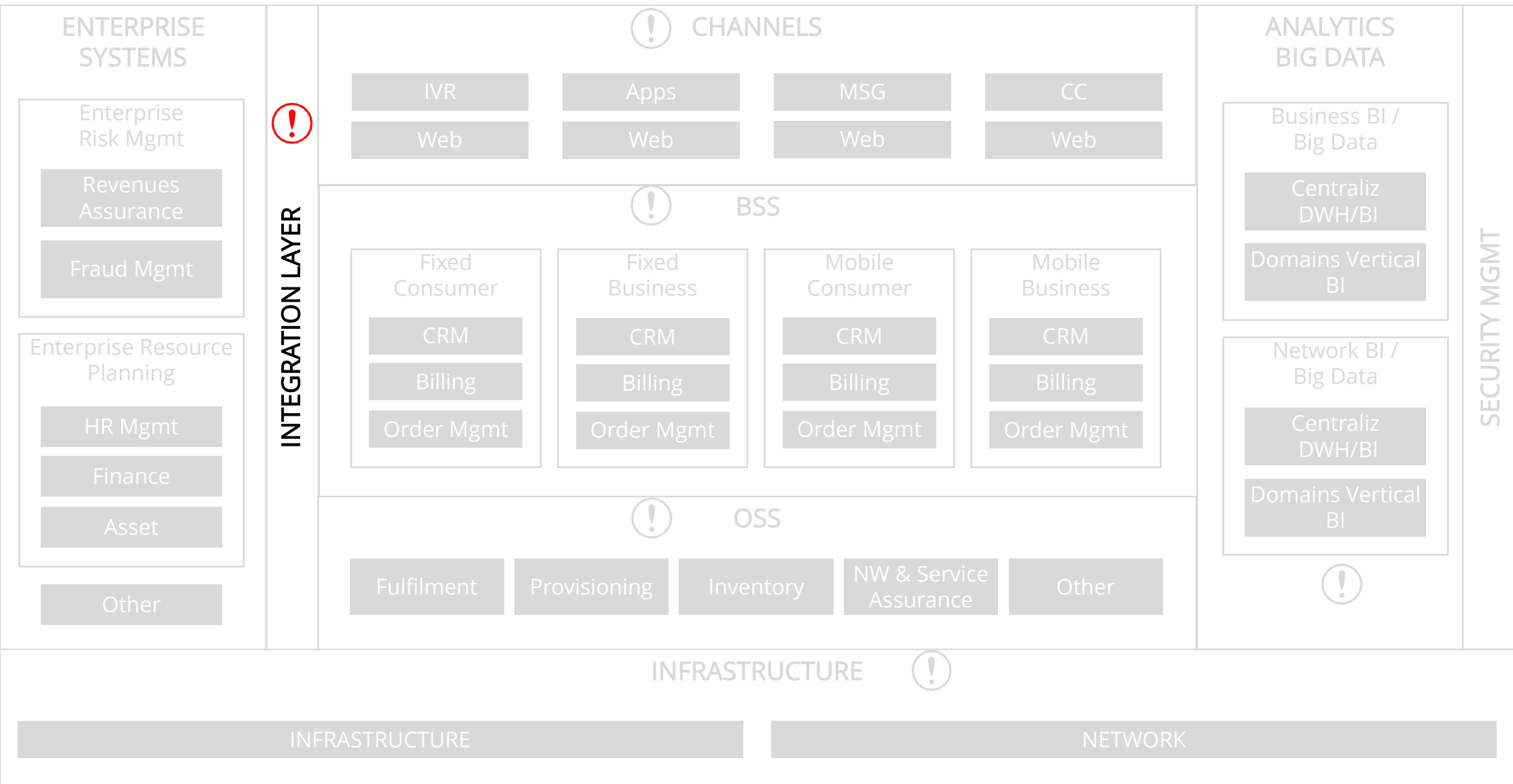**Systems maintenance and evolution is complex and expensive.**

CURRENT CONSTRAINTS AND PRESSURE POINTS

Telcos' current IT architectures are not able to satisfy business needs because of their high complexity, lack of flexibility and low level of automation

TELCO IT ARCHITECTURE

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- Vertical and legacy systems tightly coupled to vendor techs.

- End-to-end service fulfilment management not fully implemented.

- Lack of self-provisioning and automatic service tuning (self-assurance).

- Lack of real-time monitoring capabilities.

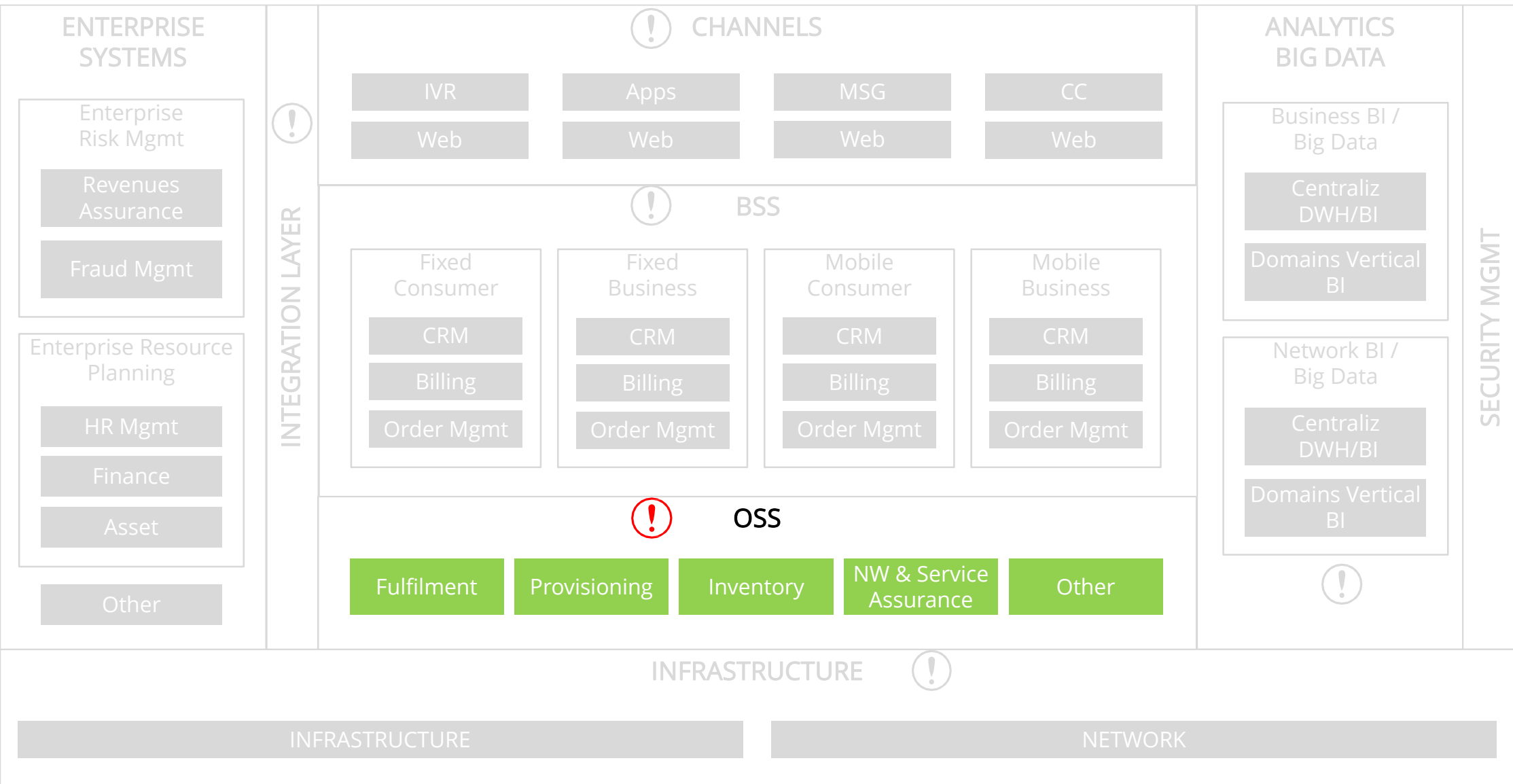- Misalignment between inventory and network topology.

CURRENT CONSTRAINTS AND PRESSURE POINTS

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INTEGRATION LAYER

CHANNELS (!)

| IVR | Apps | MSG | CC |
| Web | Web | Web | Web |

BSS (!)

Fixed Consumer	Fixed Business	Mobile Consumer	Mobile Business
CRM	CRM	CRM	CRM
Billing	Billing	Billing	Billing
Order Mgmt	Order Mgmt	Order Mgmt	Order Mgmt

OSS (!)

| Fulfilment | Provisioning | Inventory | NW & Service Assurance | Other |

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(!)

SECURITY MGMT

INFRASTRUCTURE (!)

| INFRASTRUCTURE | NETWORK |

- Usage of dedicated and non-integrated big data applications for BSS and OSS systems/processes.

- Lack of holistic/E2E view of services and customer.

- Xlarge systems with functional/data redundancy.

- Weak real-time capabilities.

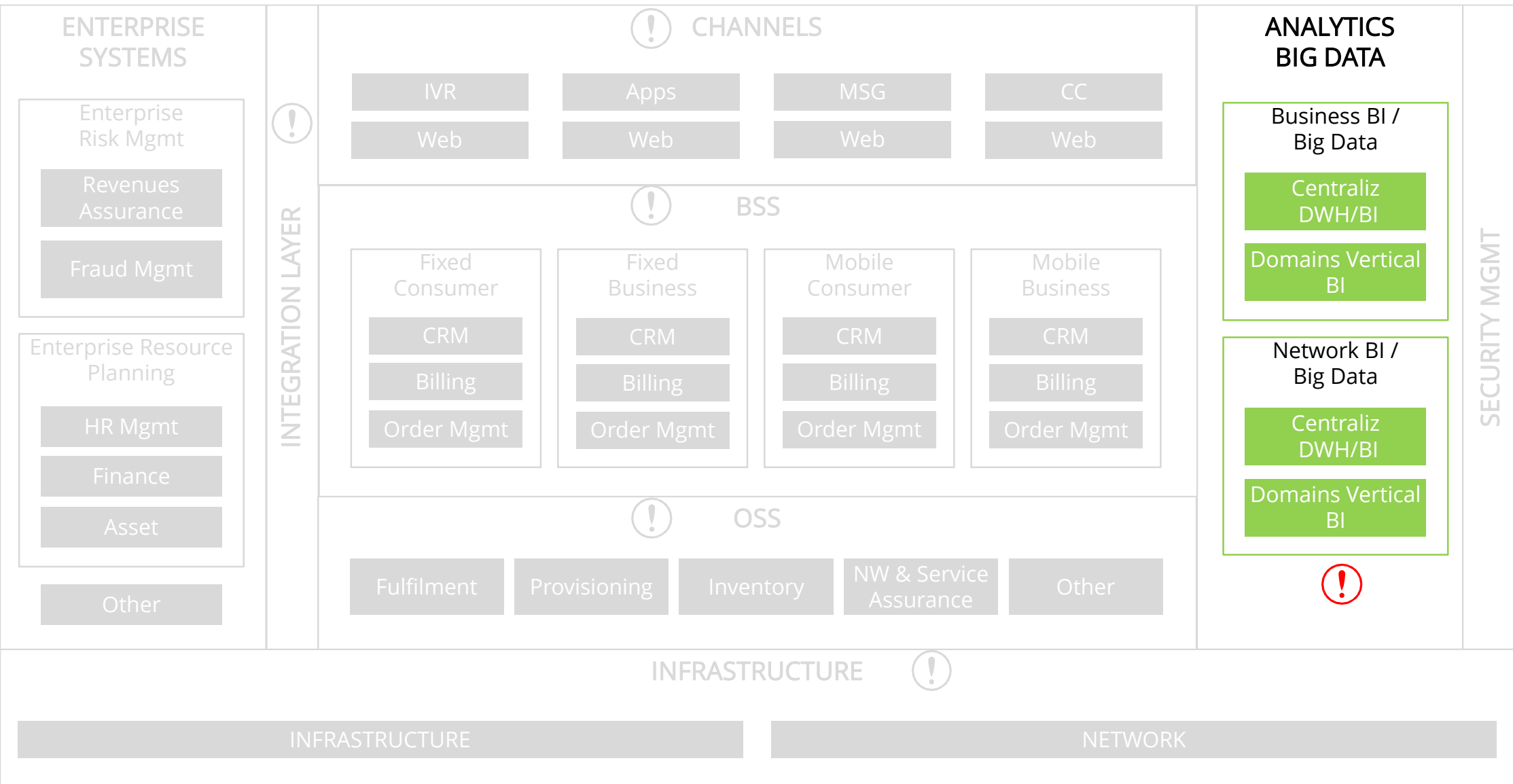- Lack of effective end-to-end data governance.

CURRENT CONSTRAINTS AND PRESSURE POINTS

Telcos' current IT architectures are not able to satisfy business needs because of their high complexity, lack of flexibility and low level of automation

TELCO IT ARCHITECTURE

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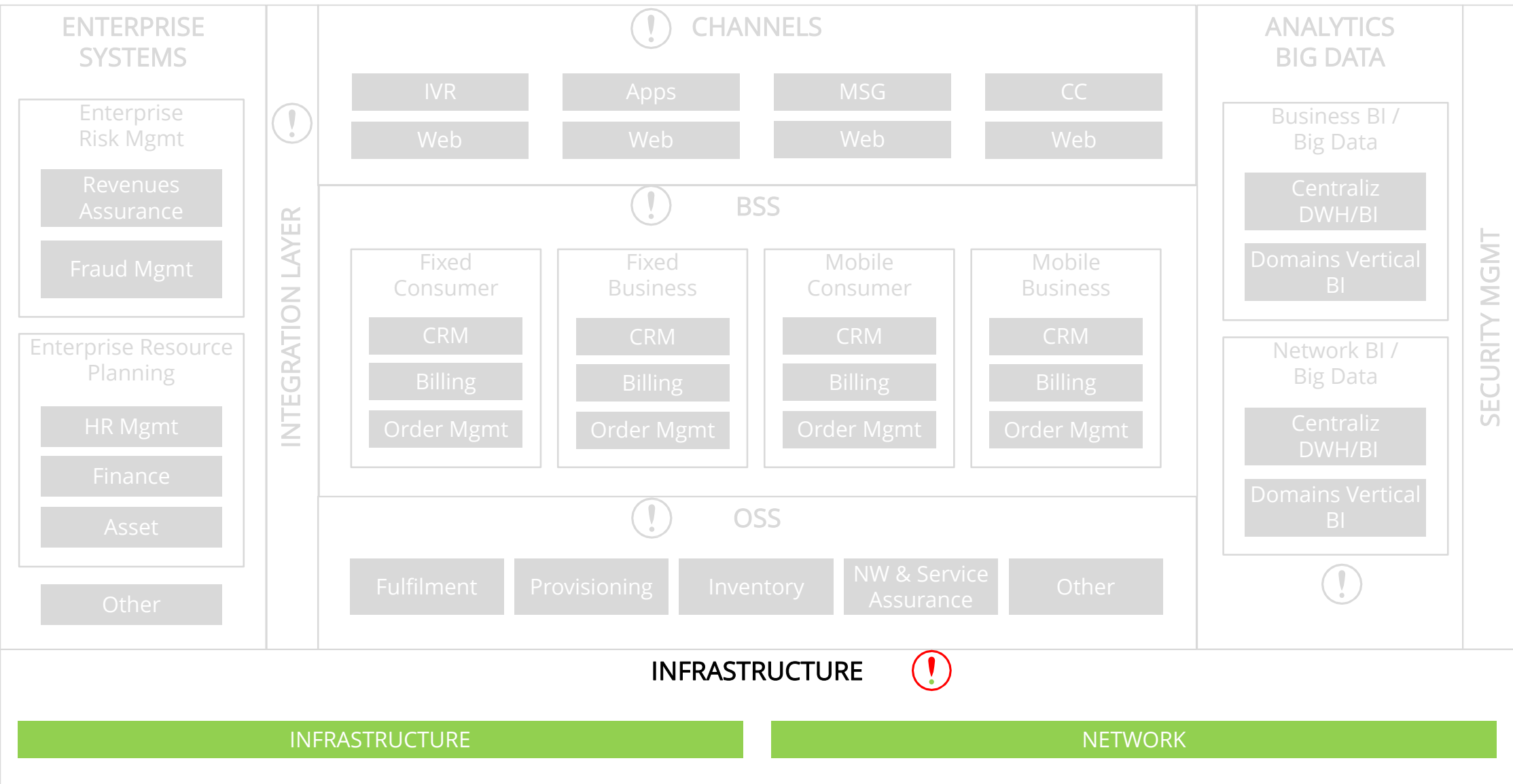
Lack of flexibility and scalability.

High complexity (multiple appliances managed with vendor proprietary protocols).

High OPEX and CAPEX.

Vendor lock-in.

Low level of automation.

Hardware provisioning and configuration is slow, impacting time to market (TTM).

MAIN TRENDS IN BSS/OSS AND THEIR LIMITATIONS

Operators are undertaking large IT initiatives to evolve their BSS/OSS ecosystems. The main initiatives involve fixed/mobile convergence, services configurability, reduction of functional redundancy and new customer engagement capabilities.

Although these BSS/OSS evolution initiatives will lead to a higher level of flexibility and effectiveness, IT will not be able to support the new business scenario without a change in the architectural patterns used and a shift in the entire IT model that goes beyond technological change.

The problem is not only identifying what kind of functional evolutions need to be implemented, but also how to evolve the IT ecosystem into an open, flexible and cost-effective model capable of adapting quickly to new business needs and integrating innovative solutions easily.

MAIN APPROACHES: BSS & CHANNELS

Main trends

SPECIFIC BUSINESS REQUIREMENTS

- provide a best-in-class customer experience across all channels

- effective engagement of native digital customers

- social interaction with customers

- shorter TTM for new products

- flexibility in the creation of new product bundles, across different lines of business

- sales optimisation (offer customers the right products at the right price).

SPECIFIC ARCHITECTURE CONSTRAINTS

- multiple, non-integrated channels, without capabilities to monitor customers' behaviour across different channels

- vertical BSS silos for line of business and customer segment, limiting the possibilities for creating new products and impacting the TTM

- multiple product catalogues; limited integration between commercial and technical catalogues.

- lack of advanced social functionalities in the Customer Relationship Management (CRM)

- basic Configure Price Quote (CPQ) capabilities, with limited usability because of lack of integration with underlying BSS.

ARCHITECTURAL TRENDS

UNIFIED CATALOGUE-DRIVEN ORDER MANAGEMENT

A catalogue-driven BSS/OSS Orchestrator is based on a multi-channel catalogue with E2E order management capabilities and supports intelligent routing algorithms to back-end and network systems

OMNI-CHANNEL CUSTOMER ENGAGEMENT CAPABILITIES

Digital channel and CRM evolution both at functional and architectural level to enable cross-channel customer experience monitoring and effective digital engagement
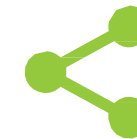
SOCIAL INTEGRATION

Integration of CRM with social networks, both for customer sentiment analysis and customer care processes

CONVERGENT BILLING SOLUTIONS

Fully convergent billing solutions which manage E2E revenue processes, encompassing real-time and batch rating, charging and billing for all types of networks, services and subscribers

MAIN APPROACHES: OSS

Main trends

SPECIFIC BUSINESS REQUIREMENTS

- enable higher level of services configurability

- near real-time provisioning and activation of new features, continuous tracking of customer usage and service performance monitoring

- enable business process integration with external partners through a controlled API environment

- proactive service assurance

- operational effectiveness and efficiency (Opex reduction).

SPECIFIC ARCHITECTURE CONSTRAINTS

- vertical and legacy systems tightly coupled to vendor techs or to legacy custom technologies

- infrastructure across different technologies and network environments

- low level of flexibility in creating new services with no self-provisioning and automatic service tuning (self-assurance)

- absence of E2E service fulfilment management.

ARCHITECTURAL TRENDS

OSS CONSOLIDATION

Evolution of OSS architecture, converging across different technologies and network environments, such as fixed, mobile, broadband, Long-Term Evolution (LTE). Consolidation implies process standardization across different stacks

OSS EVOLUTION TO SUPPORT NFV AND SDN

Evolution of Service Fulfilment and Service Assurance functions to exploit the Network Functions Virtualisation (NFV) and Software Defined Networking (SDN) capabilities, enabling flexibility, architectural simplification, real-time activation and tuning
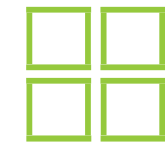
API ENVIRONMENT

Evolution of OSS services exposed to third parties, using a controlled API environment, enabling business process integration with external partners

ANALYSIS DRIVEN SERVICE ASSURANCE

Use of big data analysis to create complex and proactive service assurance

MAIN APPROACHES: DATA LAYER

Main trends

SPECIFIC BUSINESS REQUIREMENTS

- real-time capabilities for data stream visibility

- optimization of Customer Care, assurance processes and network operations

- understanding of customer behaviours to identify tailored and proactive proposal/retention actions

- selling of new services leveraging an analytics approach to profile users.

SPECIFIC ARCHITECTURE CONSTRAINTS

- separate data-warehouse (DWH) applications for OSS and BSS data and processes

- complex and heterogeneous integrations between big data applications and source systems (for example, CRM, OSS, Billing…) often based on legacy integration protocols and technologies

- weak in real-time capabilities

- lack of effective end-to-end data governance.

ARCHITECTURAL TRENDS

BIG DATA AND ADVANCED ANALYSIS

Implementation of advanced business intelligence and data analysis capabilities to gain real-time visibility on streams of data produced by transactional systems

DATA AND SYSTEMS CONSOLIDATION

Consolidation of current multiple analytics and DWH systems towards centralised systems, upgrading to state-of-the-art technologies

DATA MONETISATION THROUGH API ENVIRONMENT

Business model innovation through data exposure & API enablement to third parties to build new services and create revenue streams

BIG DATA ON THE CLOUD

Adoption of big data systems on the cloud allowing operators to meet the demand for big data and to obtain benefits from cloud (scalability/elasticity, pay-per-use and "as a service" model)

WHY IT'S INSUFFICIENT: THE NEED FOR AN IT "QUANTUM LEAP"

Operators are mainly focused on "what to do", underestimating the importance of "how to do it"

ARCHITECTURE QUANTUM LEAP
How IT needs to transform to meet future business needs

ARCHITECTURE EVOLUTION AS USUAL

TODAY

TARGET STATE

	TODAY		TARGET STATE	
RIGID	Each evolutionary requirement involves development of multiple components, interfaces, platforms, etc.	FLEXIBLE	It is possible to modify or add new functionalities rapidly	
SLOW	Development of a new application takes months or years	FAST	Development of a new application takes weeks instead of months or years	
CLOSED	Limited integration with external environments	OPEN	It is simple to integrate internal applications with external entities	
COMPLEX	Heterogeneous technologies, obsolescence, lack of standards, high redundancy	STANDARDISED	Use of homogeneous architectural models	
EXPENSIVE	High Capex (for new service development) and high Opex (to ensure running of IT)	COST-EFFECTIVE	Capex and Opex are optimised	

Although current BSS/OSS evolution initiatives will lead to greater flexibility and effectiveness, **IT will not be able to support the new business scenario without a change in the architectural patterns used.** Traditional technical architectures will not be sufficient to perform the "quantum leap" required of business to achieve the target condition.

THE NEED FOR A NEW ARCHITECTURE

Taking inspiration from IT architecture models developed by large OTTs to enable their disrupting services

KEY PILLARS OF IT ARCHITECTURE IN LARGE DIGITAL COMPANIES

Leading OTT digital players such as Google, Netflix and Facebook offer better digital services than Telcos.
OTT players' architectures are developed from modern, greenfield environments, but their technological choices are key to business success and represent the model Telcos should target.

The architecture solutions are based on three pillars: software- based infrastructure, microservice architectures, and big data technologies. The mix of these technologies enables new capabilities, such as responsiveness to change and client feedback, better quality services, use of huge volumes of data to support processes and make them automatically adapt to clients' behaviors, self-service functionalities and integrations with third-party services.

SOFTWARE-BASED INFRASTRUCTURE

Software instantiated in a fully software-managed platform with an "as-a-service" model.

Enables the rapid deployment of new services or changes (Amazon deploys new service releases every 11 seconds).

Ensure high performance and quality of services through horizontal auto-scaling, self-healing and evolved monitoring of cloud applications.
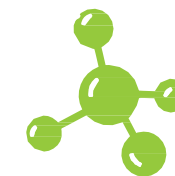
MICROSERVICE ARCHITECTURE

Software is developed on the basis of a microservice and API architecture pattern.

Microservices do not require teams to rewrite the whole application if they want to add new features.

Smaller codes make maintenance easier and faster. This saves a lot of development effort and time.

The parts of an application can be scaled separately and are easier to deploy.

BIG DATA TECHNOLOGIES

Big data capabilities are used to automate business processes from customer engagement to customer care and operations optimization.

Using data analytics to gain a clear understanding of customer's preferences in order to formulate highly targeted offers (Netflix estimate that 75% of the content subscribers watch stems from their recommendations).

AN ARCHITECTURAL VISION:
THE BSS/OSS API FABRIC

A possible IT reference model for Telco operators is the one developed by OTTs. Native digital players are able to provide reliable services to a huge number of users and implement innovations in parallel at a very rapid rate. To achieve these results OTTs have developed new IT paradigms based on the wide use of microservice architectures, API, big data and Cloud Platforms.

Adapting these paradigms to the Telco IT environment implies breaking down current monolithic applications into smaller, modular services to maximise responsiveness, resilience, flexibility, interoperability, reuse, and openness.

A POSSIBLE SOLUTION: THE BSS/OSS API FABRIC

By adapting new architectural paradigms to the Telco context, a possible target architecture can be drawn up: the BSS/OSS API Fabric architecture

The "**BSS/OSS API fabric architecture**" is a **responsive**, **resilient** and **open** ecosystem of services that interact through standard APIs.

This architecture enables a high level of **flexibility** and **speed** through wide adoption of the microservice paradigm.

The architecture will be **open to external partners and communities** of developers, enabling new services and new business models (both on and off site).

The entire development process leverages IaaS and PaaS capabilities to **reduce** drastically the **time** and **cost** of **delivery** and **of software development**.

A POSSIBLE SOLUTION: THE BSS/OSS API FABRIC

By putting together new paradigms developed by OTTs and adapting them to Telcos, a potential future architecture can be defined
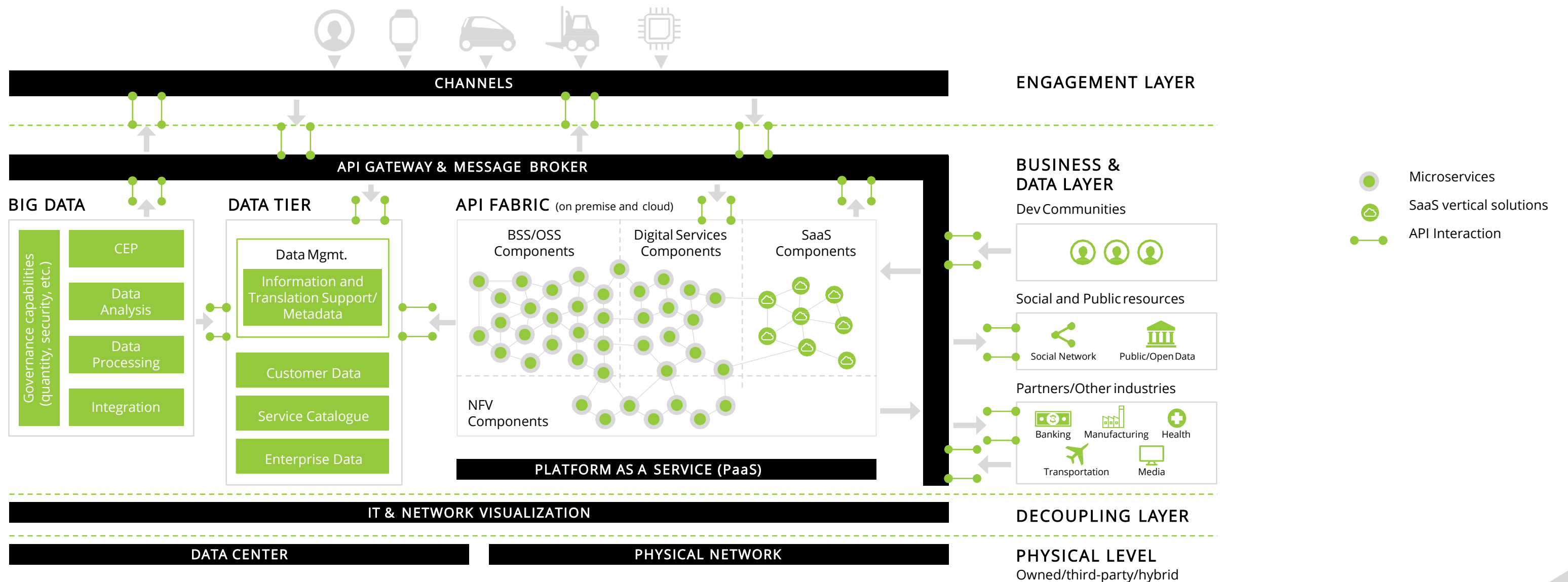
A POSSIBLE SOLUTION: THE BSS/OSS API FABRIC

The full adoption of these paradigms will imply difficult changes, as does the need for the break up of the monolithic BSS/OSS

AS-IS ARCHITECTURE

BSS

Fixed Consumer	Fixed Business	Mobile Consumer	Mobile Business
CRM	CRM	CRM	CRM
Billing	Billing	Billing	Billing
Order Mgmt	Order Mgmt	Order Mgmt	Order Mgmt

OSS

Fulfilment	Provisioning	Inventory	NW & Service Assurance	Other

TARGET SCENARIO

API GATEWAY & MESSAGE BROKER

API FABRIC (on premise and cloud)

BSS/OSS Components   Digital Services Components   SaaS Components

NFV Components

- Microservices
- SaaS vertical solutions
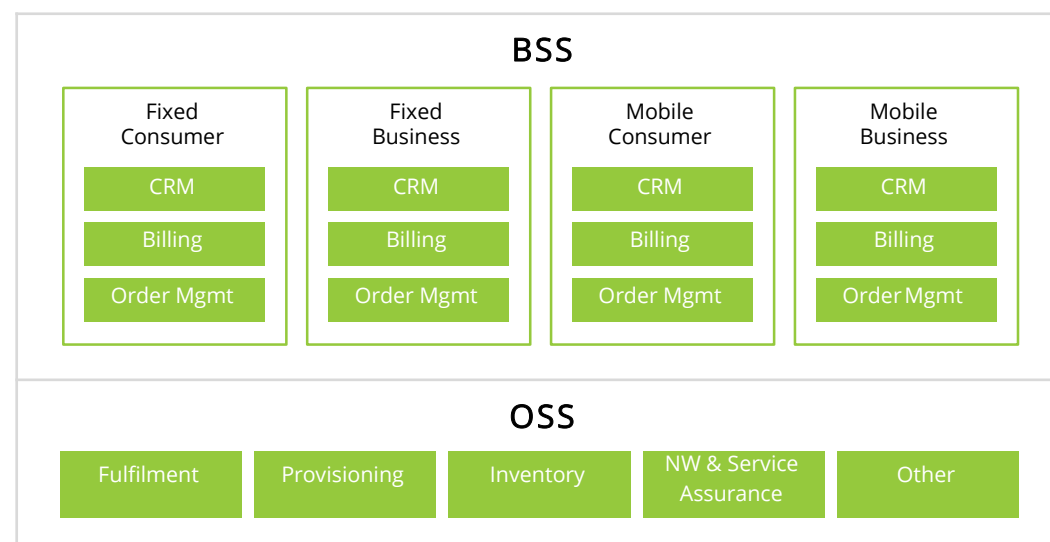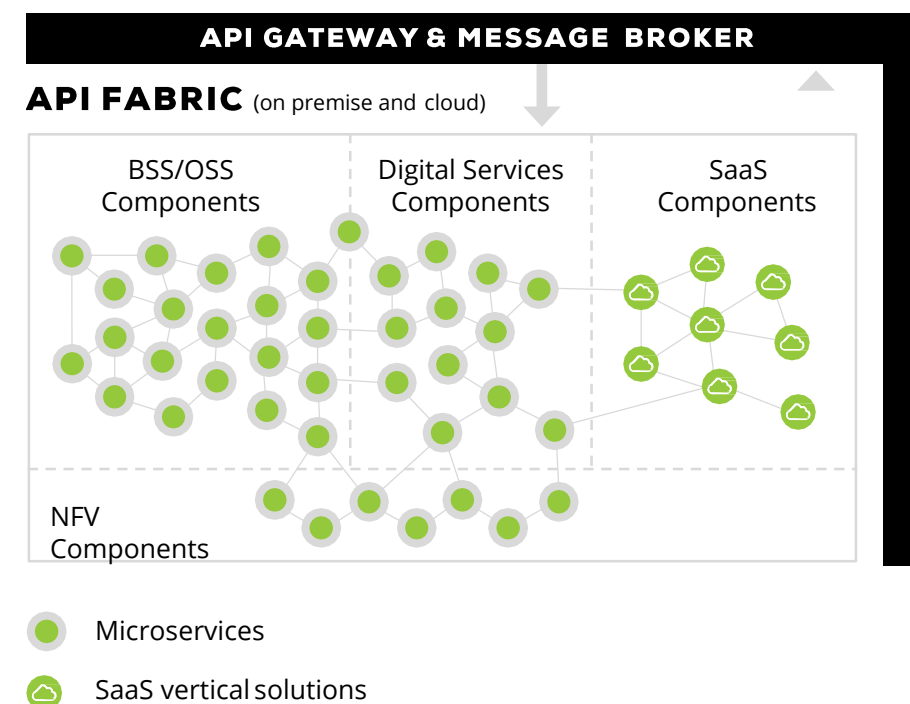
Current vertical BSS/OSS systems will be divided into smaller components, in line with the microservice paradigm, or substituted by SaaS solutions. Each component will implement a consistent and reusable functionality and will be the master of a specific data domain.

Microservices and SaaS will interact using standard API interfaces (generally REST- APIs). Business processes will be executed through a choreography model, where interactions are directly managed by microservices. The communication layer will be implemented using a simple "message bus" instead of a more complex enterprise service bus and business process management orchestrator, as was common for service oriented architecture in the past .

A POSSIBLE SOLUTION: THE BSS/OSS API FABRIC

Data needs to be shared across architectures, moving it to a centralised tier with standard input/output (I/O) interfaces

AS-IS ARCHITECTURE

BSS

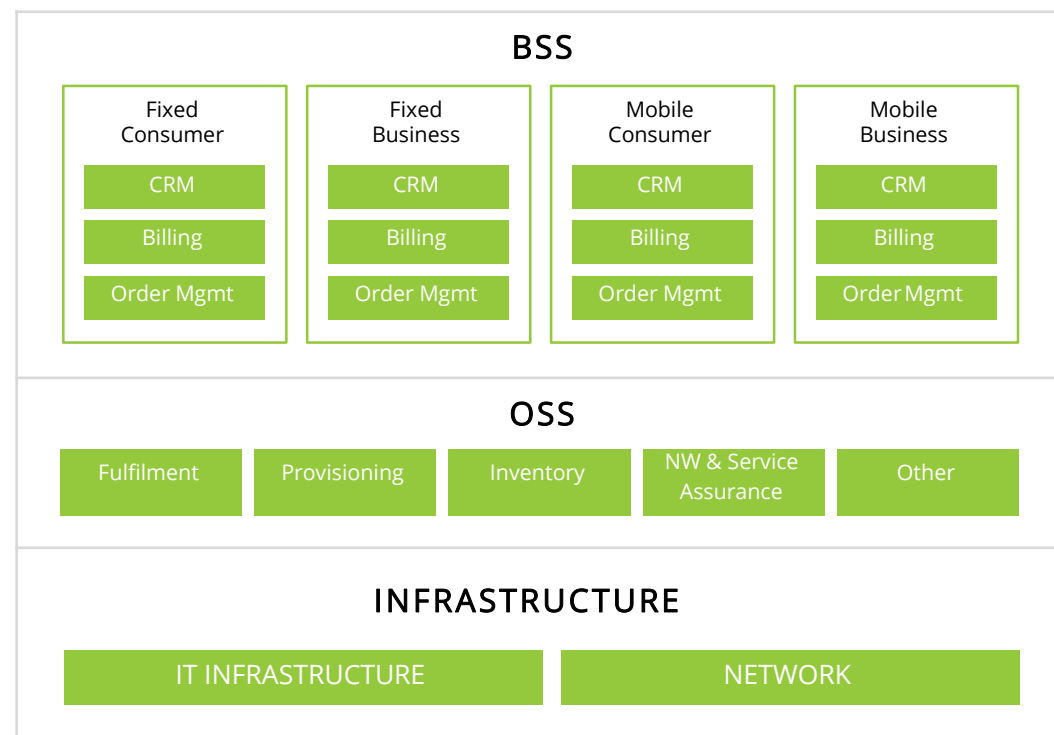| Fixed Consumer	Fixed Business	Mobile Consumer	Mobile Business
CRM	CRM	CRM	CRM
Billing	Billing	Billing	Billing
Order Mgmt	Order Mgmt	Order Mgmt	Order Mgmt

OSS

Fulfilment	Provisioning	Inventory	NW & Service Assurance	Other

INFRASTRUCTURE

IT INFRASTRUCTURE	NETWORK

TARGET SCENARIO

DATA TIER

API GATEWAY & MESSAGE BROKER

API FABRIC (on premise and cloud)

Data Mgmt.
- Information and Translation Support/ Metadata
- Customer Data
- Service Catalogue
- Enterprise Data

BSS/OSS Components | Digital Services Components

NFV Components

- Microservices
- API Interaction
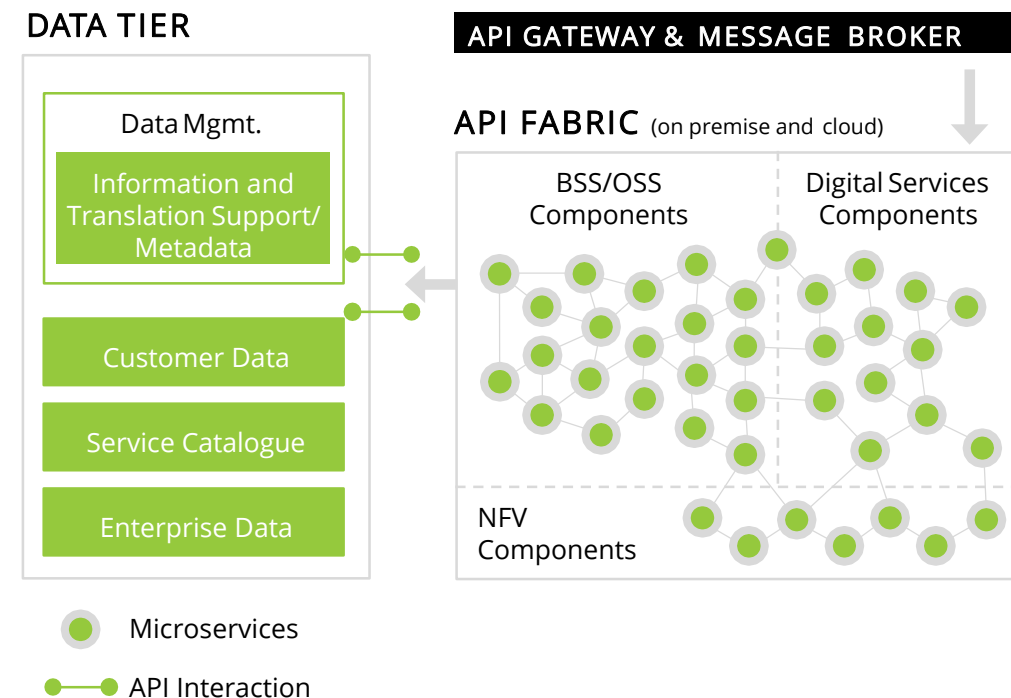
The shift towards a microservice approach requires that information and applications be separated while information needs to be shared among all enterprise users. To meet this need data will be progressively consolidated into a centrally-managed information architecture (IA), using a common, shared-information model.

The IA will be responsible for providing access to information across different functions. Access to information (information offered as a service) will be implemented using standard APIs, thus avoiding the need to understand low-level data constructions.

A POSSIBLE SOLUTION: THE BSS/OSS API FABRIC

Big Data Systems have to become the engine of business processes, exploiting prescriptive capabilities
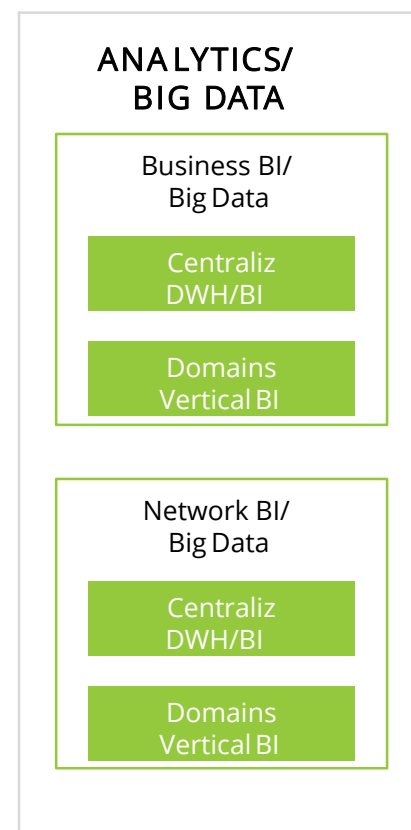
AS-IS ARCHITECTURE

ANALYTICS/ BIG DATA

Business BI/ Big Data

Centraliz DWH/BI

Domains Vertical BI

Network BI/ Big Data

Centraliz DWH/BI

Domains Vertical BI

TARGET SCENARIO

API GATEWAY & MESSAGE BROKER

BIG DATA

Governance capabilities (quantity, security, etc.)

CEP

Data Analysis

Data Processing

Integration

DATA TIER

Data Mgmt.

Information and Translation Support/ Metadata

Customer Data

Service Catalogue

Enterprise Data

API FABRIC

BSS/OSS Components

NFV Components

● Microservices
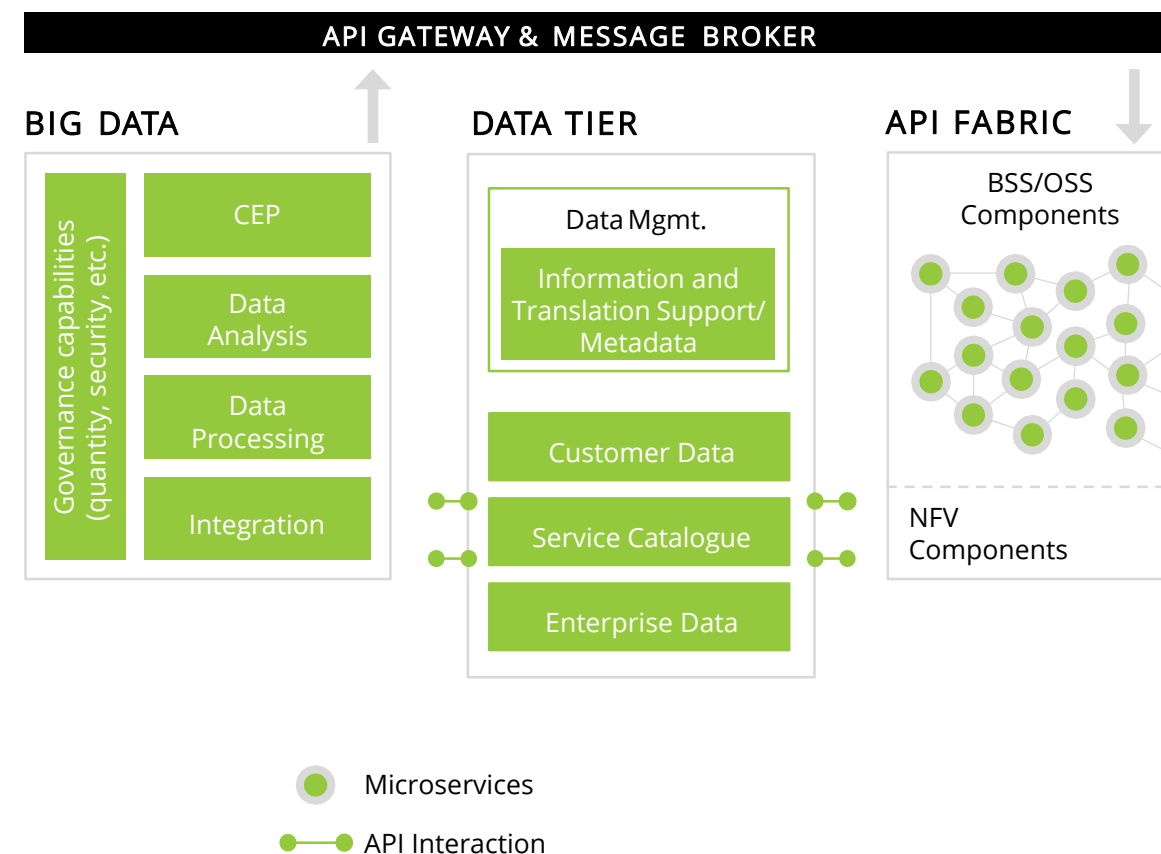
●—● API Interaction

Big data & analytics capabilities will be consolidated into centralised systems and enriched with prescriptive functionalities.

Using real-time analysis and pattern recognition, Analytics will interact with the API Fabric environments, triggering the start of optimisation workflows. Using big data analysis, Analytics will support enhancements of the customer experience: dynamic profiling, clickstream analysis, detailed weblog inquiry; precise marketing (offer optimization, churn identification, churn prediction & SNA); real-time analysis (for example, location-based services & personalised advertising); and operational efficiency.

A POSSIBLE SOLUTION: THE BSS/OSS API FABRIC

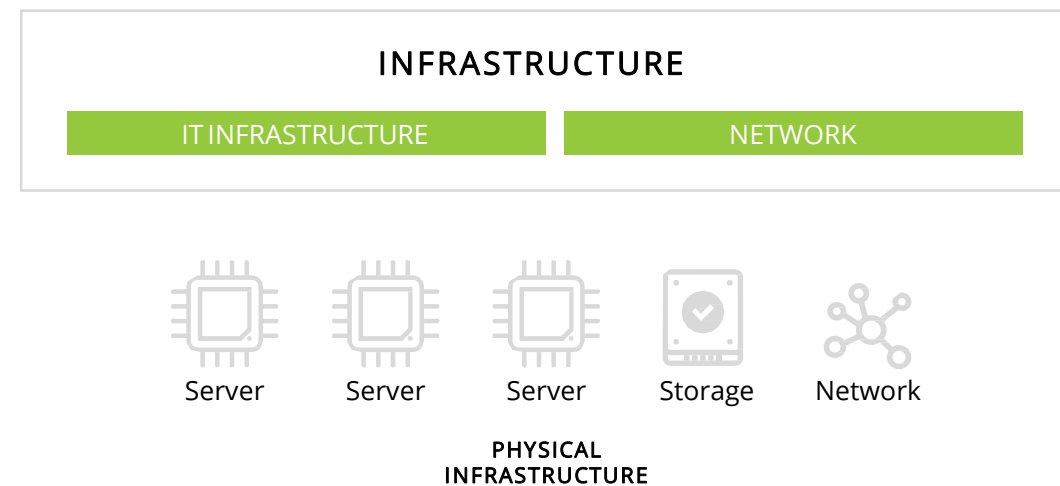IT and network Infrastructures have to undergo full "softwarization"

AS-IS ARCHITECTURE

INFRASTRUCTURE

IT INFRASTRUCTURE | NETWORK

Server | Server | Server | Storage | Network

PHYSICAL INFRASTRUCTURE

TARGET SCENARIO

API FABRIC

BSS/OSS Components | Digital Services Components | SaaS Components

NFV Components

PLATFORM AS A SERVICE (PaaS)

IT & NETWORK VISUALIZATION

DATA CENTER | PHYSICAL NETWORK

SOFTWARE INFRASTRUCTURE

01 10 10 01 | 01 10 10 01 | 01 10 10 01 | 01 10 10 01 | 01 10 10 01

INFRASTRUCTURE CODING

● Microservices

☁ SaaS vertical solutions
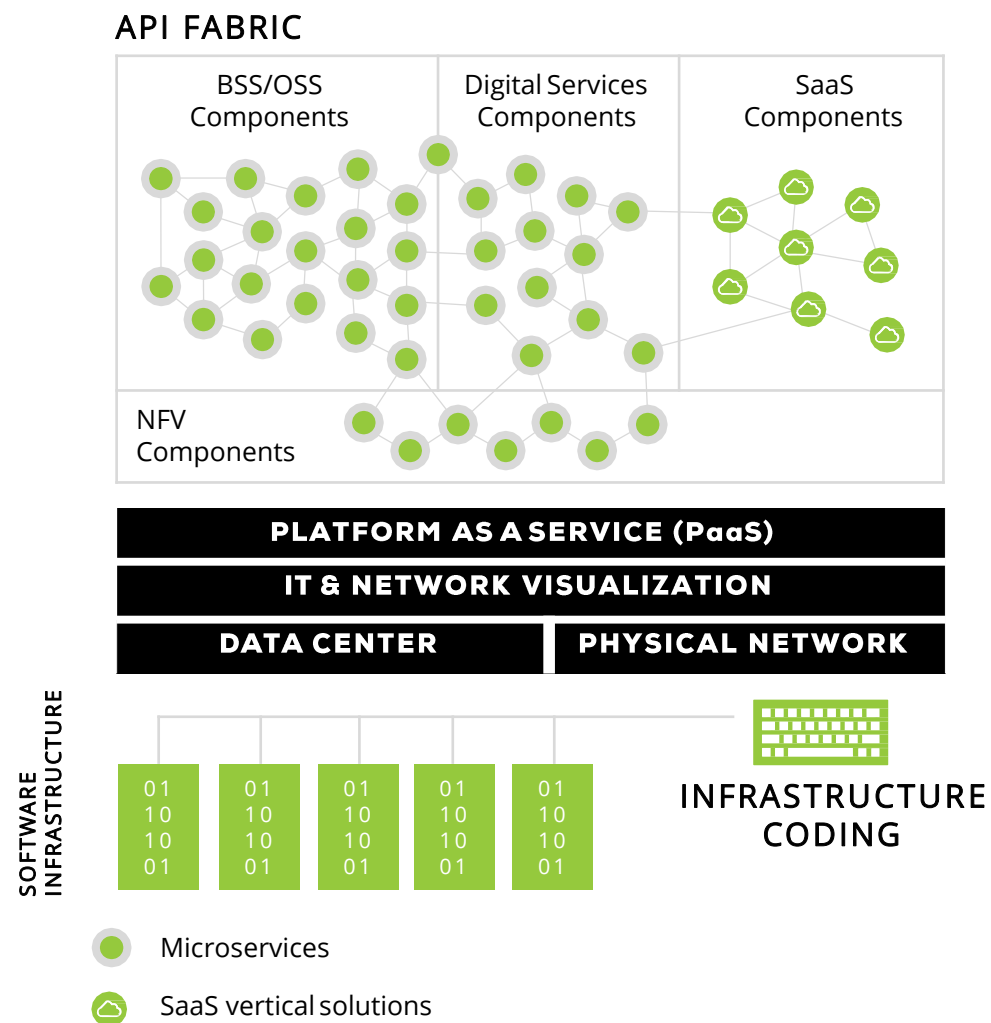
Despite virtualisation programmes, the current IT infrastructure continues to be characterised by lack of agility, automation and efficiency, which in turn generates a reduced ability to control IT costs.

To fulfil business requirements that demand agility and rapid deployment, IT infrastructure must evolve to adopt cloud technologies (and subsequent organisation), that are fundamental to the success of OTT players. Future IT infrastructure will see a progressive shift towards a "softwarization" and the adoption of an "as a Service" model.

THE BSS/OSS API FABRIC: HOW IT WILL RUN
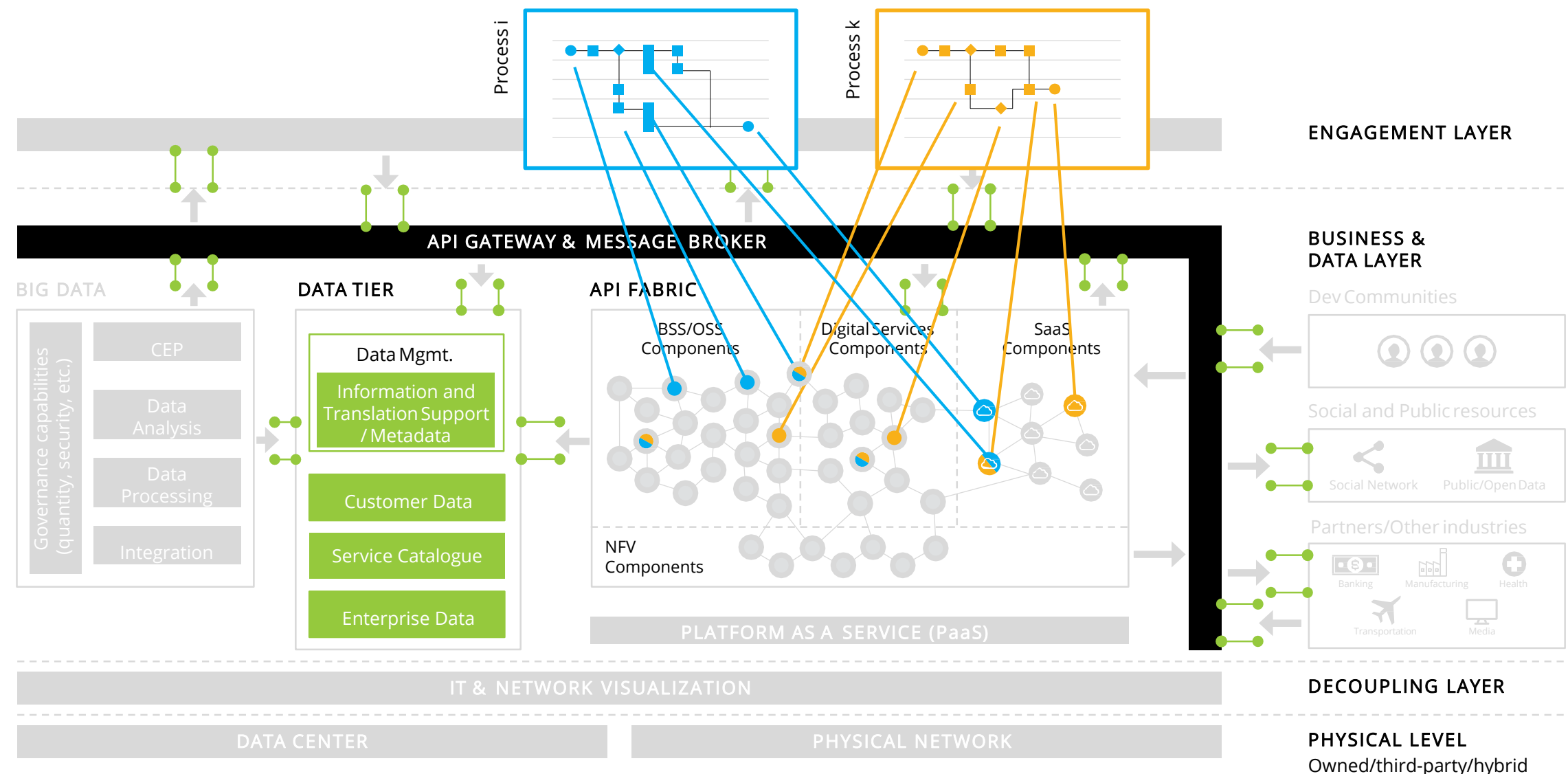
A high level of flexibility will be achieved thanks to shared functionalities across multiple processes

SERVICES REUSE | EXTERNAL INTEGRATIONS | AUTOMATIC REACTION | FAST DEVELOPMENT

Process i

Process k

ENGAGEMENT LAYER

API GATEWAY & MESSAGE BROKER

BUSINESS & DATA LAYER

BIG DATA

DATA TIER

API FABRIC

Dev Communities

Governance capabilities (quantity, security, etc.)

CEP

Data Analysis

Data Processing

Integration

Data Mgmt.

Information and Translation Support / Metadata

Customer Data

Service Catalogue

Enterprise Data

BSS/OSS Components

Digital Services Components

SaaS Components

NFV Components

Social and Public resources

Social Network

Public/Open Data

Partners/Other industries

Banking

Manufacturing

Health

Transportation

Media

PLATFORM AS A SERVICE (PaaS)

IT & NETWORK VISUALIZATION

DECOUPLING LAYER

DATA CENTER

PHYSICAL NETWORK

PHYSICAL LEVEL
Owned/third-party/hybrid

The breakdown of systems into smaller services will enable the reuse of the same technical capabilities in different business processes.
The wide reuse of services will reduce TTM and costs drastically.
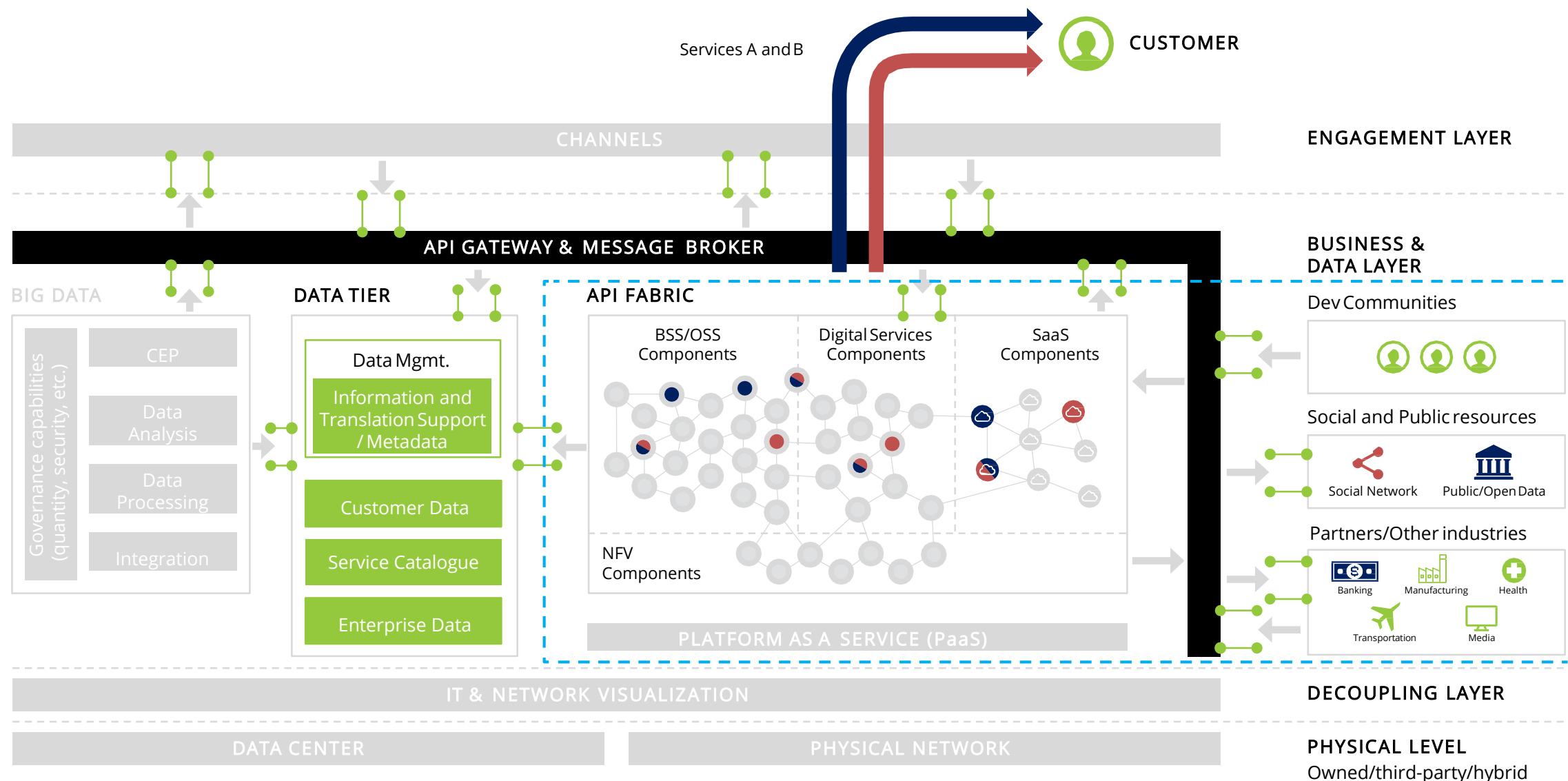
Microservices

SaaS vertical solutions

API Interaction

THE BSS/OSS API FABRIC: HOW IT WILL RUN

New business models will be enabled by seamless integration with external environments

Services A and B

CUSTOMER

CHANNELS

ENGAGEMENT LAYER

API GATEWAY & MESSAGE BROKER

BUSINESS & DATA LAYER

BIG DATA

DATA TIER

API FABRIC

Dev Communities

Governance capabilities (quantity, security, etc.)

CEP

Data Analysis

Data Processing

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Banking

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Health

Transportation

Media

PLATFORM AS A SERVICE (PaaS)

IT & NETWORK VISUALIZATION

DECOUPLING LAYER

DATA CENTER

PHYSICAL NETWORK

PHYSICAL LEVEL
Owned/third-party/hybrid

Seamless integration with external environments will be natively supported by the APIs. New services will be implemented by leveraging a wide array of external resources, interfacing with standard integrations.
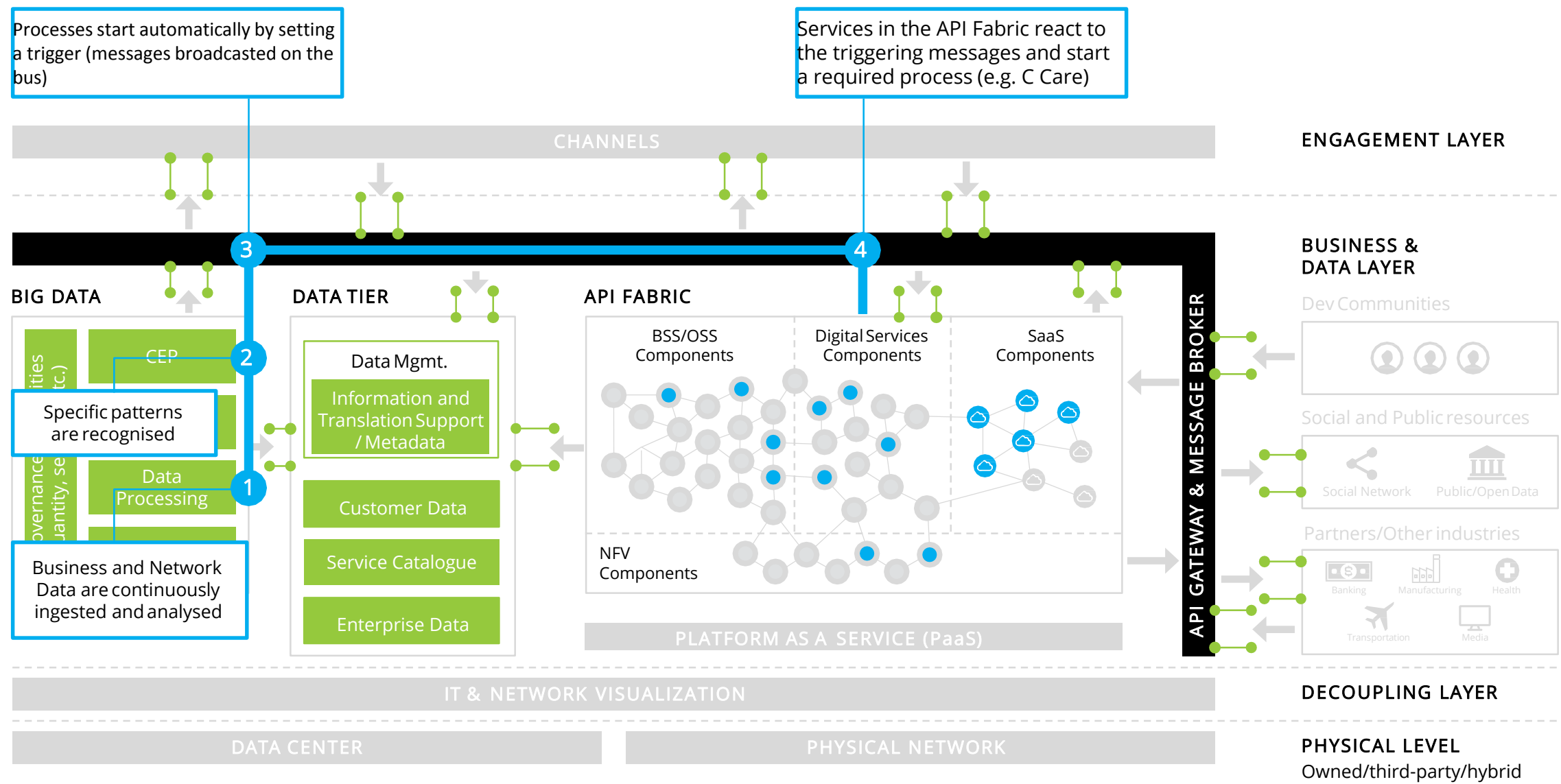
Resources used to provide service A

Resources used to provide service B

Microservices

SaaS vertical solutions

API Interaction

THE BSS/OSS API FABRIC: HOW IT WILL RUN

Data will automatically drive operational processes

SERVICES REUSE | **EXTERNAL INTEGRATIONS** | **AUTOMATIC REACTION** | **FAST DEVELOPMENT**

Processes start automatically by setting a trigger (messages broadcasted on the bus)

Services in the API Fabric react to the triggering messages and start a required process (e.g. C Care)

CHANNELS — ENGAGEMENT LAYER

BIG DATA

CEP

Specific patterns are recognised

Data Processing

Business and Network Data are continuously ingested and analysed

DATA TIER

Data Mgmt.

Information and Translation Support / Metadata

Customer Data

Service Catalogue

Enterprise Data

API FABRIC

BSS/OSS Components

Digital Services Components

SaaS Components

NFV Components

PLATFORM AS A SERVICE (PaaS)

API GATEWAY & MESSAGE BROKER

BUSINESS & DATA LAYER

Dev Communities

Social and Public resources

Social Network | Public/Open Data

Partners/Other industries

Banking | Manufacturing | Health

Transportation | Media

IT & NETWORK VISUALIZATION — DECOUPLING LAYER

DATA CENTER | PHYSICAL NETWORK — **PHYSICAL LEVEL** Owned/third-party/hybrid

Leveraging big data capabilities and complex event-processing features will make it possible to recognise patterns and react in near real time, starting the implementation of defined business processes.
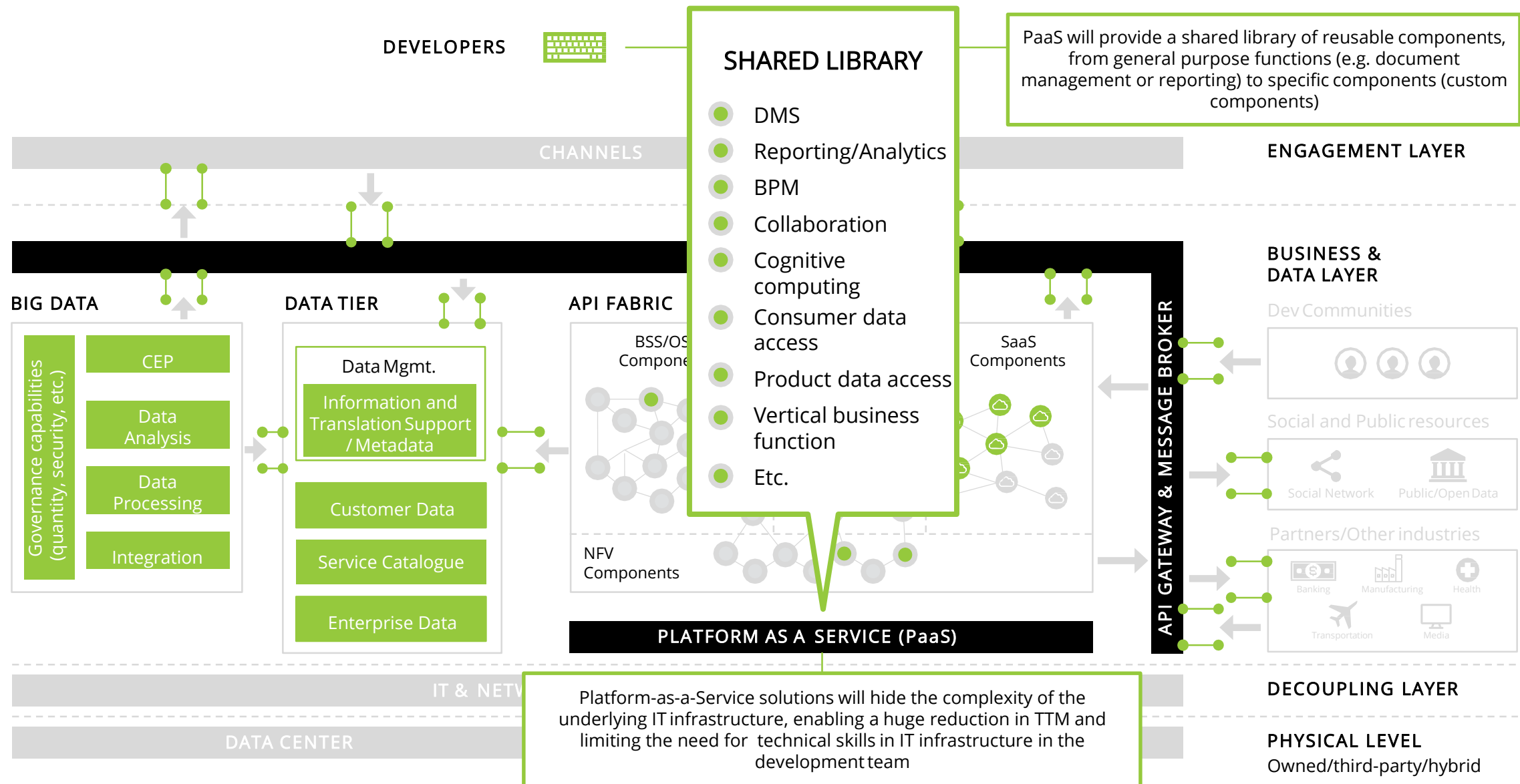
Components activated by triggering messages

THE BSS/OSS API FABRIC: HOW IT WILL RUN

New applications will be developed in weeks instead of months thanks to the reuse of existing components

SERVICES REUSE | EXTERNAL INTEGRATIONS | AUTOMATIC REACTION | **FAST DEVELOPMENT**

DEVELOPERS

SHARED LIBRARY
- DMS
- Reporting/Analytics
- BPM
- Collaboration
- Cognitive computing
- Consumer data access
- Product data access
- Vertical business function
- Etc.

PaaS will provide a shared library of reusable components, from general purpose functions (e.g. document management or reporting) to specific components (custom components)

CHANNELS

ENGAGEMENT LAYER

BUSINESS & DATA LAYER

BIG DATA

Governance capabilities (quantity, security, etc.)

CEP

Data Analysis

Data Processing

Integration

DATA TIER

Data Mgmt.

Information and Translation Support / Metadata

Customer Data

Service Catalogue

Enterprise Data

API FABRIC

BSS/OSS Components

NFV Components

SaaS Components

API GATEWAY & MESSAGE BROKER

Dev Communities

Social and Public resources

Social Network   Public/Open Data

Partners/Other industries

Banking   Manufacturing   Health

Transportation   Media

PLATFORM AS A SERVICE (PaaS)

Platform-as-a-Service solutions will hide the complexity of the underlying IT infrastructure, enabling a huge reduction in TTM and limiting the need for technical skills in IT infrastructure in the development team

IT & NETW

DATA CENTER

DECOUPLING LAYER

PHYSICAL LEVEL
Owned/third-party/hybrid

New applications will be developed using standard building blocks, provided by PaaS solutions, thus limiting the need for new Software (SW) coding. The building blocks library will be progressively enriched with organisation-specific components, supporting wide automation.

Microservices

SaaS vertical solutions

API Interaction

THE BSS/OSS API FABRIC: BENEFITS

The API Fabric model is able to fulfil business needs, overcoming all the constraints of traditional architectural approaches in terms of Applications, Data and Infrastructures

KEY IT REQUIREMENTS

APPLICATIONS
- develop new applications and new components rapidly and with low investment
- substitute hard-coded business workflows with parametric functionalities
- maximize the reuse of existing applications, avoiding functional redundancy
- architecture must support full interoperability, enabling "plug & play" of new components.

DATA
- create effective big data capabilities that integrate the full volume of data produced by BSS/OSS systems
- ensure data consistency and single point of truth for each data category (customer data, product data...)
- create perspective analytics with the ability to trigger business processes.
- data becomes a core backbone to enable the Digital Business

INFRASTRUCTURES
- processing, storage and network capabilities have to be deployed in hours instead of months and have to scale automatically in response to application peaks
- infrastructure operating expenses have to be reduced drastically
- infrastructure has to maintain a high level of resilience, automatically responding to incidents or component failures.

HOW THE ARCHITECTURE ADDRESSES THEM

- new applications can be developed using existing building blocks provided by XaaS and API Fabric, thus limiting the need of new Software coding
- microservice architecture guarantees strong modular and parametric components design
- the architecture is fully based on microservices that are self-contained and independent, so that they can be composed, integrated and reused avoiding redundant code proliferation.

- internal and external data are collected in a single layer that ensures master data management and data consistency
- the architecture includes a big data/data tier infrastructure designed to collect data produced both by external channels as well as OSS/BSS systems
- big data has predictive capabilities that integrate and analyse customer and enterprise data in order to address and activate business processes automatically, so they can be composed, integrated and reused avoiding redundant code proliferation.

- the IT & Network infrastructure is fully virtualised to ensure rapid automatic provisioning and a vertical/horizontal scalability of IT and network resources, such as storage, load balancers and routers
- infrastructure & Network Virtualization can count on core capabilities, such as dynamic monitoring, high availability and full tolerance of resources, thus enabling prediction of failures and consequent proactive reactions.

A POSSIBLE MIGRATION STRATEGY

The evolution towards the BSS/OSS API Fabric architecture has a wide impact on the entire IT ecosystem, along with its Technologies, Processes, Organisation and People. A smooth transition approach will be the most suitable strategy to make the change, while a big bang approach could be too risky and complex.

The migration strategy starts with the introduction of software-based infrastructure (IaaS and PaaS) as a tool to develop and integrate the microservices of new applications with the DevOps approach. Once the organisation reaches a good understanding of the new model, IT can start to migrate legacy applications to the new environment.

MIGRATION STRATEGY: IMPACTED AREAS

The evolution towards a microservice architecture has a wide impact on the entire IT ecosystem

TECHNOLOGY

- implementation of a "softwarized" infrastructure, based on 'Infrastructure as a Service' & 'Platform as a Service' solutions (mainly with a hybrid model)

- resizing and development of applications in line with microservice requirements and patterns

- migration of legacy applications to the new model.

PROCESSES

- new software development process: re-design of the SW development life-cycle process, adopting DevOps and Agile methodologies enabled by cloud capabilities

- governance processes: adapt IT governance processes to address the use of scalable architectures (for example, impact on SW licensing, pay-per-use model and cost allocation) and the need to maintain a single set of master data.

ORGANIZATION

- establish effective architectural governance to support the transition phase. Establish new roles and responsibilities to design, develop and operate the "softwarized" infrastructure on which microservice BSS/OSS applications will run

- reshape the organization to work with a microservice landscape effectively.

PEOPLE

- new skills and people required in order to manage the new technologies adopted and to support the development of new applications, adhering to the cloud-oriented paradigm requirements.

MIGRATION STRATEGY: POSSIBLE ALTERNATIVES

In most cases, a "smooth transition" approach will be more suitable than a centralised "big bang" initiative

	DESCRIPTION	PROS	CONS	
BIG BANG	• define a multi-year structured initiative to migrate the current BSS/OSS environment to microservice architecture • integrate the initiative into the current IT master plan to address current business needs	• well-defined roadmap • simpler to define intermediate state and control/checks • availability of a unique architectural plan (implemented by a central authority) increases the level of consistency and priority management	• very high risk of failure due to high complexity • difficult to address the migration along with ongoing business needs • big investment needed	Migration to the API Fabric model requires a deep transformation of the entire IT system (not only at an architectural level, but also in terms of processes, organisation and people). Moreover, this transformation has to go along with the "business-as-usual" needs for BSS/OSS evolution.
SMOOTH TRANSITION	• set up the foundational IT environment for the microservice architecture (IaaS, PaaS and related processes) • start to develop new applications using a microservice approach • leverage BSS/OSS re-engineering needs driven by business initiatives to migrate legacy applications progressively	• lower risk of failure • lower budget needs: investments are mainly related to the setup of IaaS/PaaS environments • the level of adoption goes along with the maturity level of the IT organisation (also at process and skill level	• lack of a clear roadmap • requires more time to reach visible benefits • requires strong architecture governance to enforce and drive evolution over a multi-year timeframe	In most cases, the "smooth transition" approach will be the most suitable strategy to face the challenges brought on by change.

MIGRATION STRATEGY: "SMOOTH TRANSITION" APPROACH

In a "smooth transition", migration to the "API Fabric" will go along with the increasing maturity of the organisation

ROAD MAP | CUSTOM APPLICATION MIGRATION | COTS-BASED APPLICATION MIGRATION

STEP 1

BUILD THE UNDERPINNING INFRASTRUCTURE

The first step is the setup of the "softwarized" infrastructure (IaaS & PaaS solutions), that will host the API-Fabric. The environment will provide key capabilities, such as high scalability, rapid deployment, resource optimisation. Along with the technology implementation, the setup requires the evolution of processes and organisation).

STEP 2

PRACTISE WITH "SIMPLE" THINGS: NEW APPLICATIONS

Once the "softwarized" infrastructure is up and running, IT has to begin to develop new applications on top of it. New applications will adhere to the microservice architecture, so they will be implemented using small independent components, interacting by means of standard API interfaces.

STEP 3

WHEN THE ORGANISATION IS READY: FACE THE LEGACY TRANSFORMATION

Once the organisation reaches a good understanding of the new model, it will begin to migrate the legacy applications. The "think big, start small" strategy has to also be adopted in this phase. Custom applications and COTS-based applications will require a tailored approach.
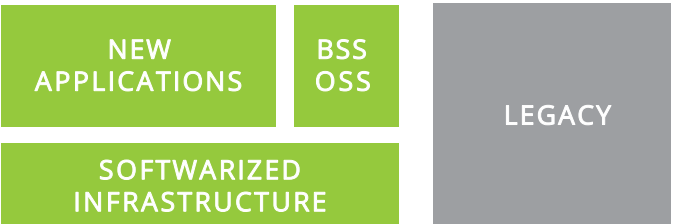
	LEGACY BSS/OSS
SOFTWARIZED INFRASTRUCTURE	

NEW APPLICATIONS	LEGACY BSS/OSS
SOFTWARIZED INFRASTRUCTURE	

NEW APPLICATIONS	BSS OSS	LEGACY
SOFTWARIZED INFRASTRUCTURE		

MIGRATION STRATEGY: "SMOOTH TRANSITION" APPROACH

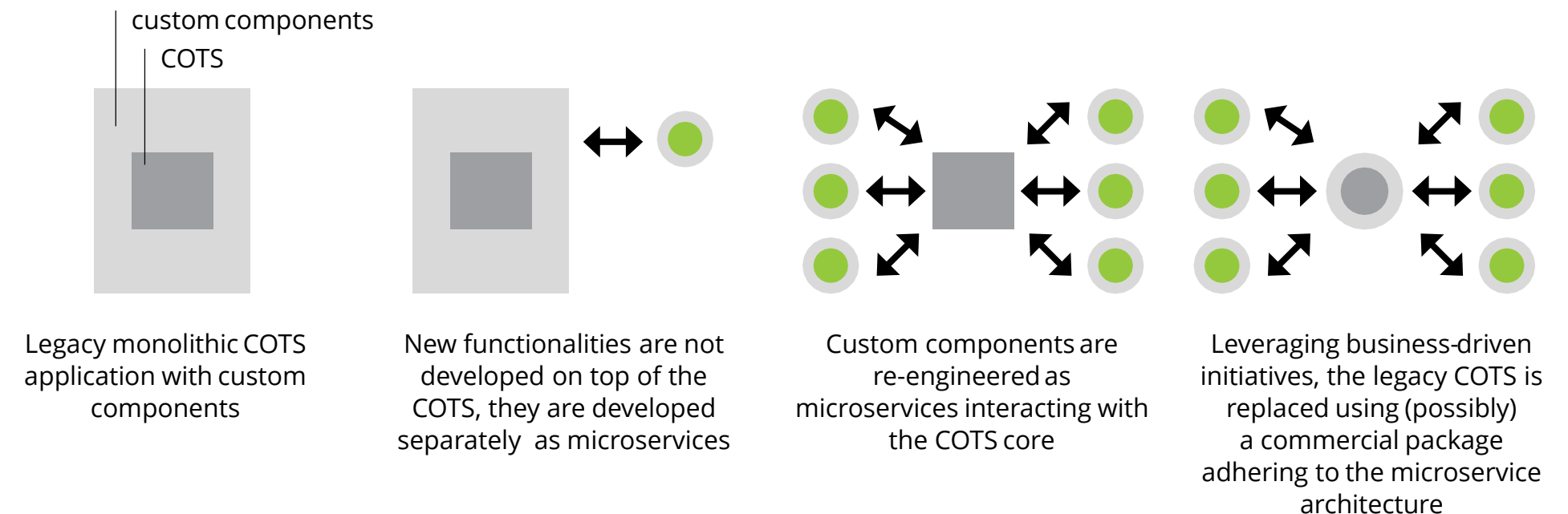Transforming legacy applications with limited impact on the business - custom applications

An application can be classified as "custom" when the entire software code implementing the business logic is available. Generally, a "custom" application consists of code (e.g. J2ee) running on top of the application server.

In the case of a custom application, it is possible to redesign the entire application by adopting a microservice approach. In most cases, this will require a change of software stack (e.g. using a different kind of Database Management System) and re-engineering of the code.

Although the company owns the code, the re-engineering of the application could be complex owing to lack of full knowledge of the internal structure of the application.

By adopting a so-called **"strangler" migration approach**, organisations could move a custom application to a microservice structure piece by piece (all at once, in case of a functional domain). In this approach the legacy application undergoes a **progressive transition to a microservice architecture**, without major disruptions.
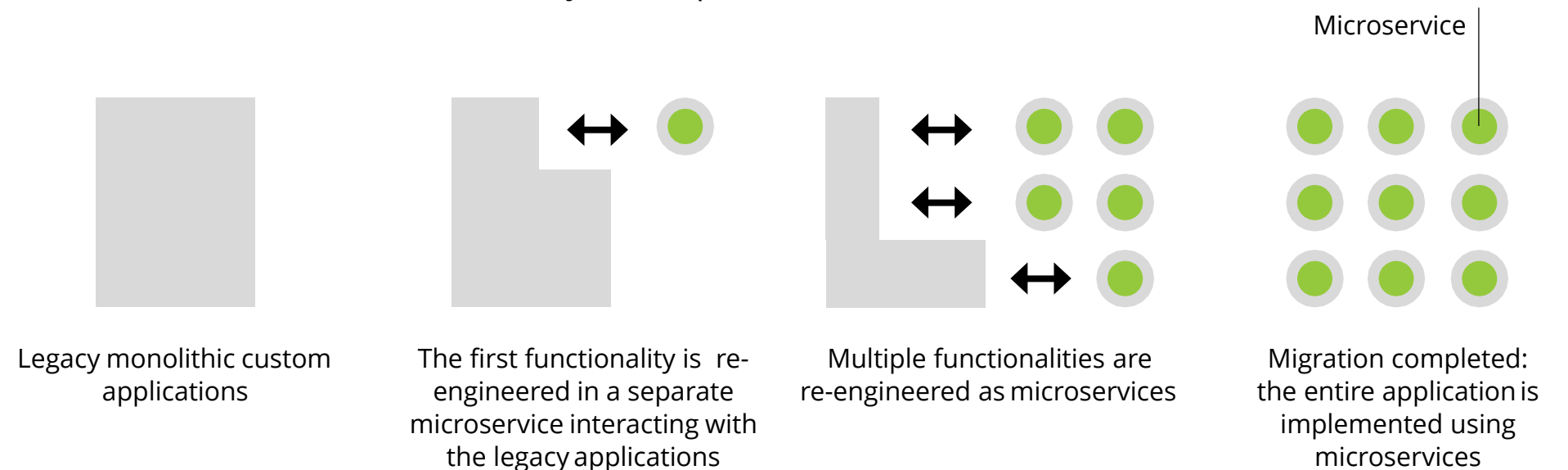
Microservice

Legacy monolithic custom applications

The first functionality is re-engineered in a separate microservice interacting with the legacy applications

Multiple functionalities are re-engineered as microservices

Migration completed: the entire application is implemented using microservices

MIGRATION STRATEGY: "SMOOTH TRANSITION" APPROACH

Transforming legacy applications with limited impact on the business - COTS Applications

An application is classified as "COTS-based" when the main part of the business logic is implemented by a SW package (e.g. CRM-Siebel). Generally, the SW code of the COTS is not available to organisations (it remains the property of the SW vendor). Although configuration capabilities are often embedded in the COTS software, organisations tend to develop custom code on top of the COTS to implement organisation-specific business processes.

The migration of COTS-based applications to microservices is more complex, as the organisation cannot redesign the internal COTS code (as this is not available), so a replacement for COTS is necessary.

The migration of a **"COTS-based" application** can start from the custom components running on top of the COTS package.
This transition will **reduce complexity**, enabling a simpler replacement of the COTS when the business requires a major process change.

custom components
COTS

Legacy monolithic COTS application with custom components

New functionalities are not developed on top of the COTS, they are developed separately as microservices

Custom components are re-engineered as microservices interacting with the COTS core

Leveraging business-driven initiatives, the legacy COTS is replaced using (possibly) a commercial package adhering to the microservice architecture

HOW DELOITTE CAN HELP

Deloitte is recognized as the global leader in IT Consulting and Services and is able to offer unique services as the result of a mix of independence, business vision and knowledge of architectural models and trends. Deloitte's professionals can offer a variety of tailored services, covering all organisational needs and requirements, from IT strategy & architecture to vertical implementation.

Deloitte supports all major Telco operators and has a deep knowledge of current IT architectures, processes and business needs.

DELOITTE: WORLD-CLASS CAPABILITIES

With a global network spanning across 150 countries, Deloitte offers world-class capabilities and deep local expertise to help clients succeed

AMERICAS | 89,934

EMEA | 71,895

ASIA PACIFIC | 41,125
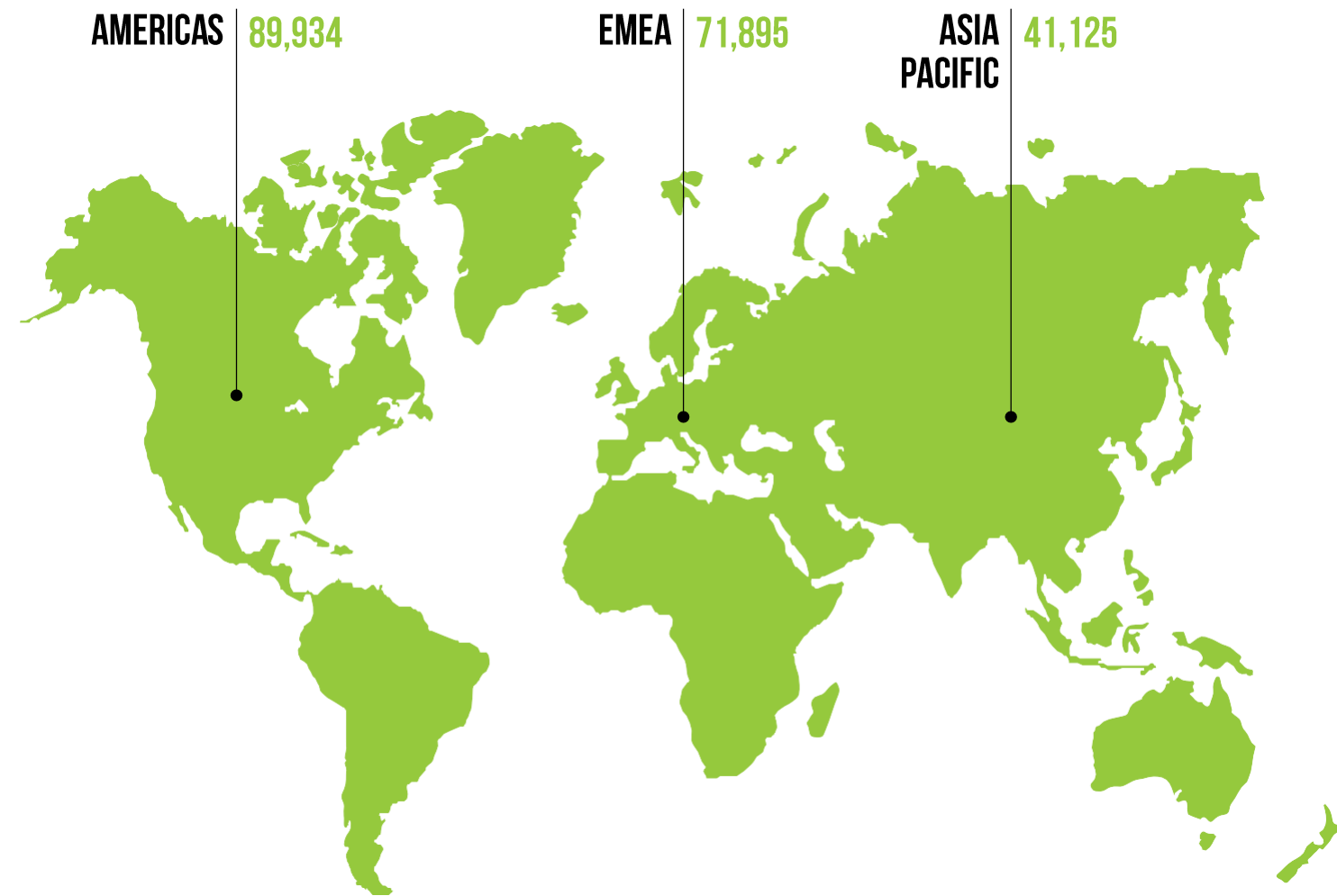
Deloitte's 225,000 professionals are committed to becoming the standard of excellence

DELOITTE'S DISTINGUISHING FEATURES

INTEGRITY

Deloitte believes that nothing is more important than its own reputation and that behaving with the highest level of integrity is fundamental to what Deloitte represents.

COMMITMENT TO PEOPLE

Deloitte believes its culture of collegiality without boundaries is a competitive advantage for the network and is therefore committed to developing and preserving it. Deloitte has a strong commitment to supporting its people.

AMBITION TO EXCEL IN CUSTOMER SERVICE

Deloitte plays a critical role in helping both the capital markets and its customers to operate more efficiently. Deloitte sees this role as a privilege and is aware that it requires a strong commitment.

ENHANCEMENT OF CULTURAL DIFFERENCES

The challenges faced by Deloitte's clients are complex and require multi-dimensional thinking. Deloitte believes that working with people with different backgrounds, cultures and ways of thinking can help its people grow and become better leaders and professionals.

DELOITTE: ANALYST RECOGNITION

We are consistently recognized by analysts as a market leader for the breadth and depth of our capabilities and services

Worldwide Leader in Digital Customer Strategy & Experience based on breadth and depth of capabilities

By Kennedy[2]

Global Leader in Consulting Services for Digital Operations, Customer and Brand Engagement and Digital Products and Services

By IDCS[4]

The Global leader in Analytics IT Consulting based on capabilities

By Kennedy[6]

A global leader in Enterprise Architecture Consulting based on ability to execute and completeness of vision

By Gartner[8]

Ranked #1 in Global Consulting for the 5th consecutive year

By Kennedy[1]

2015 SAP Pinnacle Award: Quality Partner of the year

SAP[3]

2015 Oracle Excellence Award for Specialized Partner of the year

Oracle[5]

A global leader in Salesforce.com Implementation based on current offering and strategy

By Forrester[7]

A global leader in Cyber Security Consulting based on capabilities

By Kennedy[9]

1. Source: Kennedy Consulting Research & Advisory; Global Consulting Services 2014 Vendor Assessment by Cushing Anderson, February 2015, IDC #254320 2. Kennedy Consulting Research & Advisory; Digital Customer Strategy & Experience Consulting; Kennedy Consulting Research & Advisory estimate © 2015 ALM Media Properties, LLC. Reproduced under license. 3. Source: SAP Pinnacle Awards 2015 (http://www2.deloitte.com/us/en/pages/about-deloitte/articles/press-releases/deloitte-receives-2015-sap-pinnacle-award-quality-partner-of-the-year.html) 4. Source: IDC MarketScape: Worldwide Digital Strategy Consulting: Digital Operations, 2015 Vendor Assessment by Michael Versace, August 2015, IDC #2548553 5. Source: Oracle Excellence Awards, 2015 (http://www.oracle.com/partners/en/partner-with-oracle/market-and-sell/opn-awards/index.html). 6. Source: Kennedy Consulting Research & Advisory; IT Consulting: Analytics 2014; Kennedy Consulting Research & Advisory estimates © 2014 Kennedy Information, LLC.Reproduced under license. 7. Source: Forrester Research, Forrester WaveTM: Salesforce Implementation Partners, Q2 2015", Liz Herbert, June 26, 2015. 8. Source: Gartner, Magic Quadrant for Enterprise Architecture Consultancies, Saul Brand, 24 June, 2015. 9. Source: Kennedy Consulting Research & Advisory; Cyber Security Consulting 2013; Kennedy Consulting Research & Advisory estimates © 2013 Kennedy Information, LLC. Reproduced under license.

BSS/OSS TRANSFORMATION: DISTINCTIVE FEATURES

Deloitte can support clients in the development of a future-proof BSS/OSS architecture, leveraging a unique combination of capabilities

Deloitte has developed a deep knowledge of the Telco industry. Our professionals are involved in the business evolution of **all major Telco companies across the globe.** In parallel, Deloitte's research centres provide continuous monitoring of the Telco market, identifying business trends and helping our Clients anticipate their customers' needs.

Because of this knowledge, the **technological vision of Deloitte is always linked to the business needs and requirements** of its customers.

As a result of its **independence from hardware and software vendors,** Deloitte is able to define IT strategies and architectural solutions **aligned only to the client's needs.**

Deloitte can ensure impartial analysis when clients have to decide which technologies to adopt, helping clients create not-locked-in architectures.

BUSINESS KNOWLEDGE

IT EXPERTISE

VENDOR INDEPENDENCE

Deloitte.

Deloitte has strong IT expertise developed while supporting clients across the globe in their projects to **define, plan and implement IT strategies.** Deloitte has been involved in a large number of **complex BSS/OSS initiatives and IT transformation programmes.**

Thanks to its cross-sectoral IT experience, Deloitte can support its clients in their effort to drive an effective and optimised IT architecture evolution.

DELOITTE — TECHNOLOGY SERVICE

Strategy, Analytics & Information, Digital & Transformation, Integration

TECHNOLOGY STRATEGY & ARCHITECTURE

- **tech–enabled innovation & strategy:** IT strategy, technology plan, portfolio management

- **cloud & infrastructure:** cloud solutions selection, IaaS & PaaS design, cloud transformation programme, enterprise & solution architecture (application optimization, architecture blueprint, architecture design)

- **IT sourcing:** IT sourcing model definition, vendor strategy, SW selection, vendor rating, vendor monitoring

- **merger & acquisition:** IT integration strategy and governance after M&A processes.

INFO MANAGEMENT & ANALYTICS

- **advanced analytics:** emerging analytics, predictive analysis, big data analytics, social analytics

- **analytics:** dashboard, KPI monitoring, marketing analytics

- **enterprise data management:** data governance, master data management, extract-trasform-load (ETL)

- **data visualization & exploration:** interactive data visualization, associative analytics, self-service analytics

- **corporate reporting & dashboard.**

DELOITTE DIGITAL

- **digital experience:** user experience analysis, customer journey, web marketing, web and mobile development

- **cloud enterprise resource planning (ERP) & integration:** leading cloud ERP solutions and integration, including NetSuite, workday financials and mulesoft

- **commerce & content:** project analysis, requirements building, support implementation

- **digital customer – Oracle & salesforce:** innovating marketing, sales, solutions based on on-premise or cloud models

- **advertising & market:** market branding, best-in-class strategic thinking.

SYSTEM INTEGRATION & ENTERPRISE APPLICATION

- **solution integration:** System integration

- **programme integration & MGMT:** design, planning and technical governance

- **system development:** SAP and Oracle platforms development

- **functional & test:** functional and technical tests

- **system & infrastructure design:** technical assessment, business requirements gathering, architecture design.

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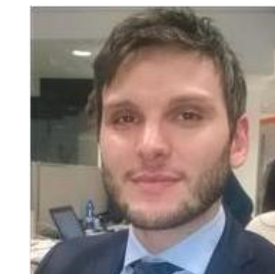
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