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Mega
Trends

Defining Our Future:
Are You Ready?

World's Top Global Mega Trends To 2025 and Implications to Business, Society and Cultures

Definition of Mega Trends That Frost & Sullivan Tracks

Mega Trends are transformative, global forces that define the future world with their far reaching impacts on businesses, societies, economies, cultures, and personal lives.

Global Mega Trends

Urbanization – City as a Customer	Bricks and Clicks	Future Infrastructure Development
Smart is the New Green	Innovating to Zero	Health, Wellness and Well Being
Social Trends: Gen Y, Middle Bulge, She-conomy, Geosocialization	Future of Energy	Future of Mobility
Connectivity and Convergence	Economy: Beyond BRIC: The Next Game Changers	New Business Models: Value for Many

Source: Frost & Sullivan analysis.

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News Headlines in 2025

Robots have entered our homes for personal use.
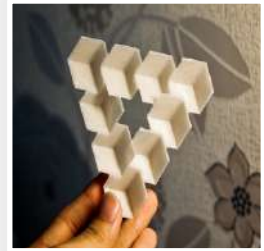

Big data has entered the Zettabyte era.

Sensory devices guide our everyday lives.

3D printing is commonplace. 4D printing is gaining mainstream acceptance .

Mobile financial transactions are now in crypto-currencies.

High Speed Rail to connect from China to Europe.

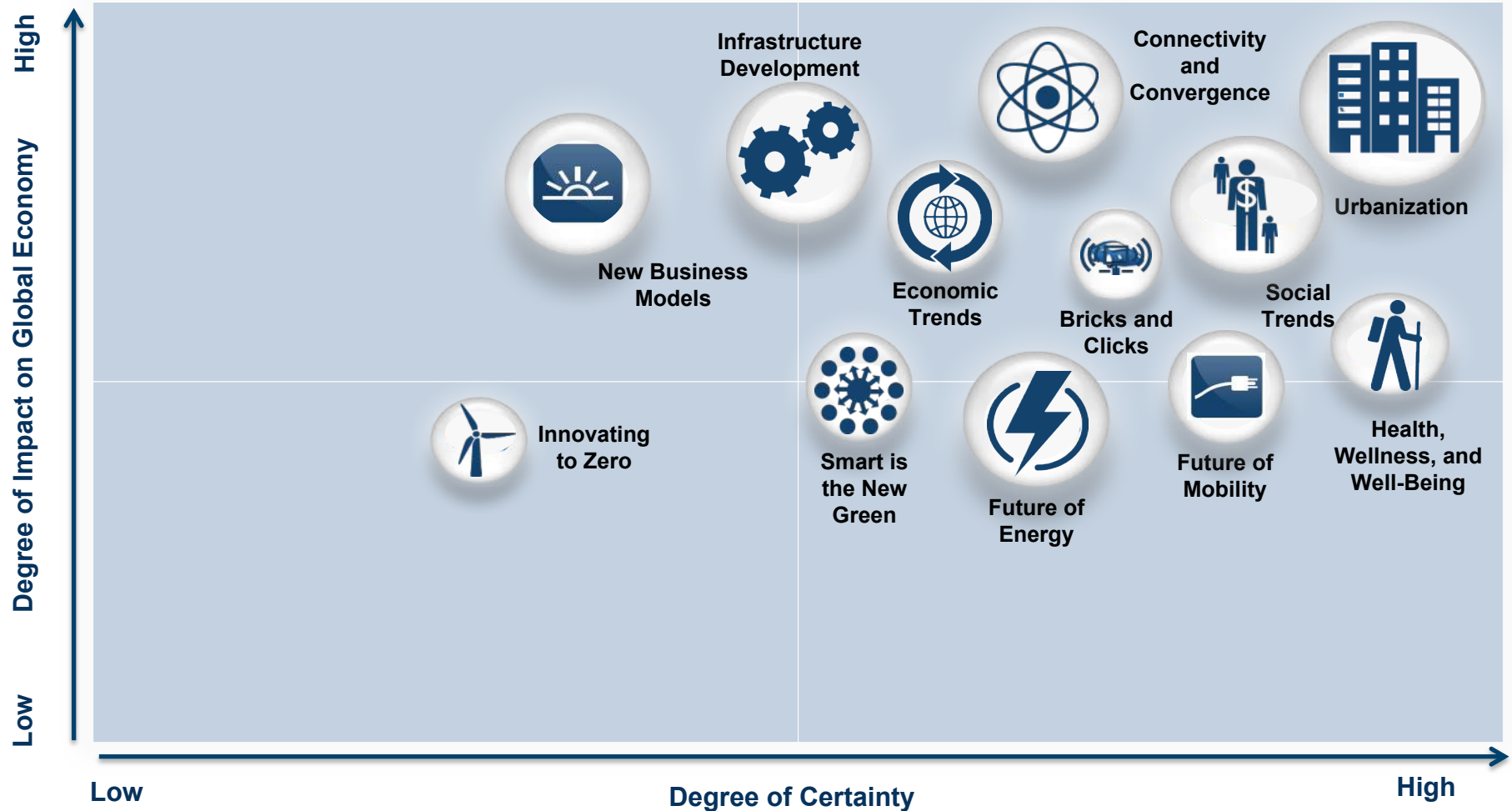There are 6 million autonomous cars in Europe and North America.

Summer Sale: Low-cost holidays in space.

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The Mega Trend Matrix
Understanding Implications of Key Mega Trends on Global Economy

Mega Trend Matrix, Global, 2025

Degree of Impact on Global Economy — High / Low

Degree of Certainty — Low / High

- Infrastructure Development
- Connectivity and Convergence
- Urbanization
- New Business Models
- Economic Trends
- Bricks and Clicks
- Social Trends
- Innovating to Zero
- Smart is the New Green
- Future of Energy
- Future of Mobility
- Health, Wellness, and Well-Being

Note: The size of the bubble represents the scale of opportunity within each Mega Trend.
These Mega Trends have been plotted based on quantitative and qualitative reasoning.

Source: Frost & Sullivan Analysis

Future Connected Living Ecosystem

Connected life contains three important aspects of connected home, connected city, and connected work

Connected Living describes a world in which consumers use many different devices to experience compelling new services that integrate video, voice, and data services to provide access and ubiquitous connectivity anytime and anywhere.

Connected Living Total Market: $730 Billion in 2020

Connected Home – 31%

- Home Automation
- Home Energy
- Home Health
- Home Entertainment

Connected Work –15%

- Mobility - Mobile email, Unified Communication
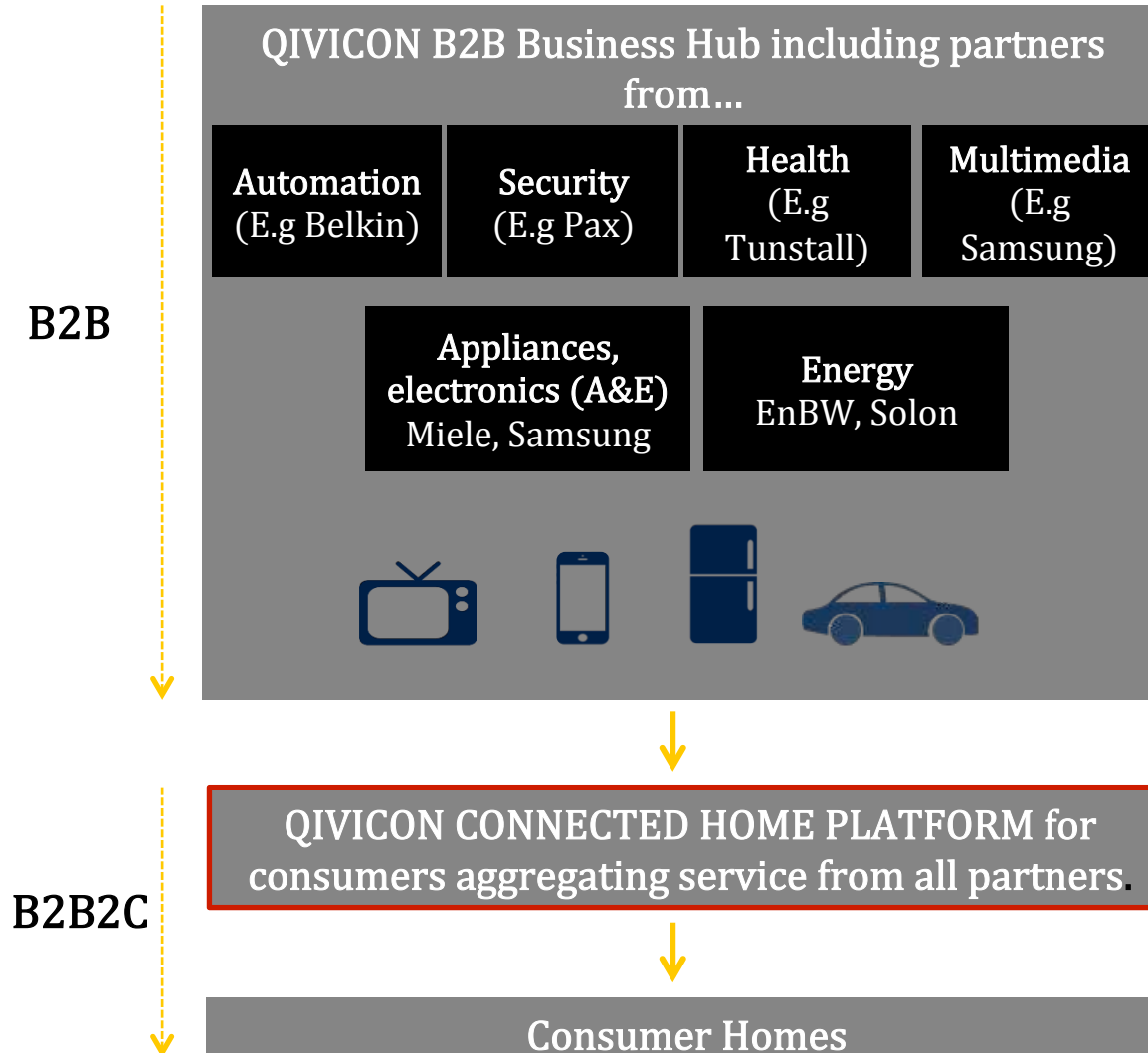- Mobile Working
- Enterprise Social Networking

Connected City – 54%

- eGovernance
- eCitizens
- Smart transportation cards, connected cars
- E-learning
- Mobile banking

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Case Study: Connected Home's B2B Platform Of Deutsche Telekom
A platform-based approach that brings together leading companies

B2B

QIVICON B2B Business Hub including partners from...

Automation (E.g Belkin)	**Security** (E.g Pax)	**Health** (E.g Tunstall)	**Multimedia** (E.g Samsung)

Appliances, electronics (A&E) Miele, Samsung

Energy EnBW, Solon

B2B2C

QIVICON CONNECTED HOME PLATFORM for consumers aggregating service from all partners.
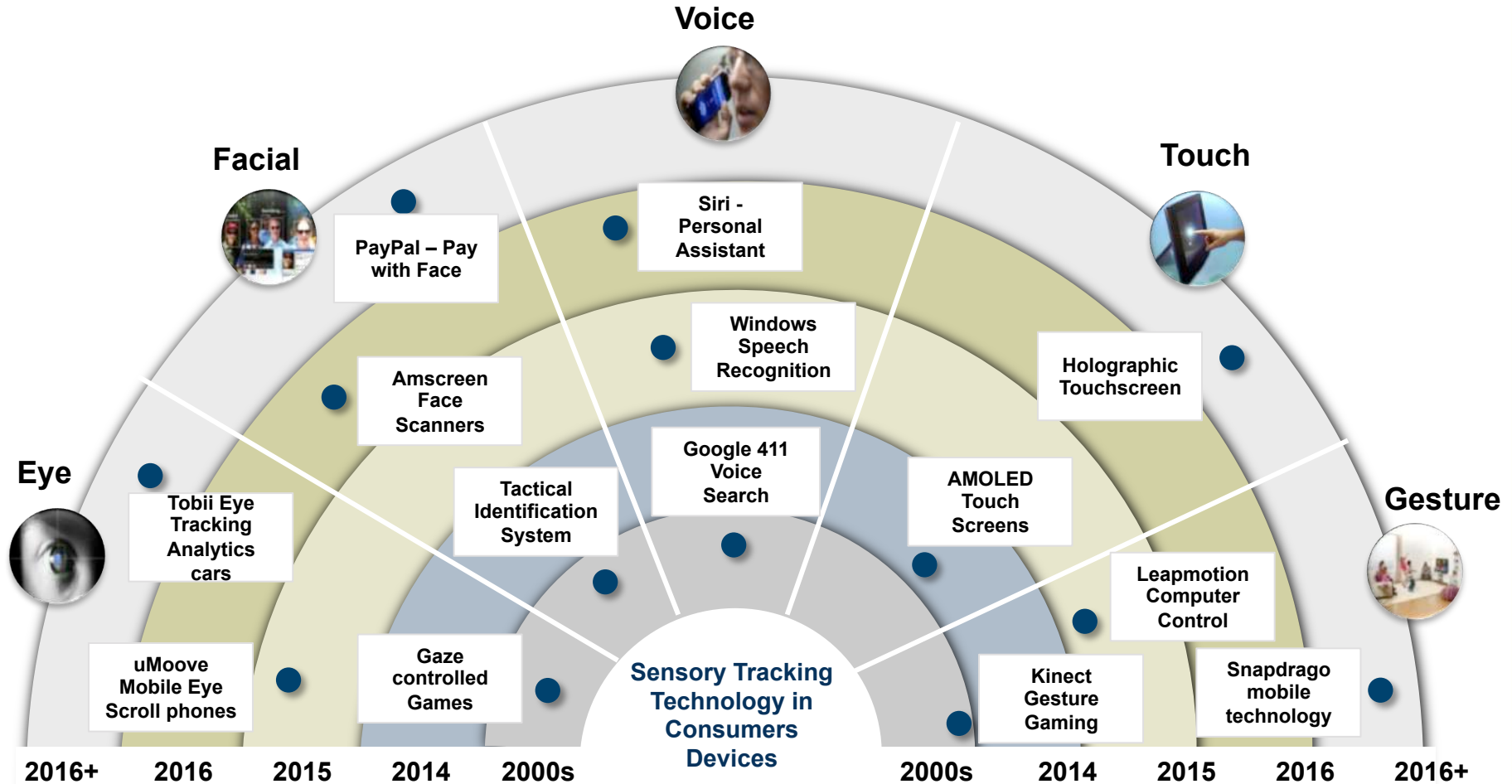
Consumer Homes

- First company worldwide to offer a **"software as a service'** connected home platform

- **Open and independent** B2B platform for partners

- Largest range of partners in the connected home space

6

Sensorization of Things
Multi-Factor sensory-based trackers revolutionise the field of personal devices

The radial timeline diagram depicts which products are impacted in the next decade by sensory tracking technology in consumer electronics

Voice

Facial

Touch

Eye

Gesture

- PayPal – Pay with Face
- Siri - Personal Assistant
- Windows Speech Recognition
- Holographic Touchscreen
- Amscreen Face Scanners
- Tobii Eye Tracking Analytics cars
- Tactical Identification System
- Google 411 Voice Search
- AMOLED Touch Screens
- Leapmotion Computer Control
- uMoove Mobile Eye Scroll phones
- Gaze controlled Games
- Kinect Gesture Gaming
- Snapdrago mobile technology

Sensory Tracking Technology in Consumers Devices

| 2016+ | 2016 | 2015 | 2014 | 2000s | | 2000s | 2014 | 2015 | 2016 | 2016+ |

Source: Frost & Sullivan Analysis

Gamification - solutions to generate $8 billion globally within a decade, driven by increasing need for consumer engagement

Gamification – a customer interaction approach to design behaviours, develop skills and engage customers

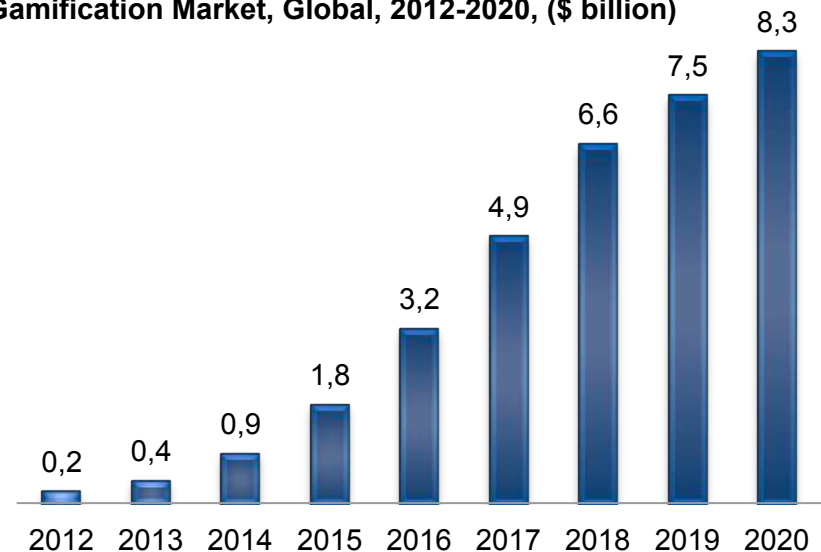|	**Uses**	**Predicted areas of impact**	**Current enablers**	**Future enablers**
The use of game mechanics and design in non game context to impact engagement and outcome	•Mobile and tablet applications •Software programs •Educational tools	•Employee performance •Education •Personal development •Customer engagement platforms	•Mobile •Cloud •Social networking •Location based services	•Gesture control •Augmented reality

Consumer App Usage Patterns, Global, 2012

- Games: 20 %
- Social Networking: 16 %
- Enetrtainment: 14 %
- Maps/Navigation: 10 %
- Video: 10 %
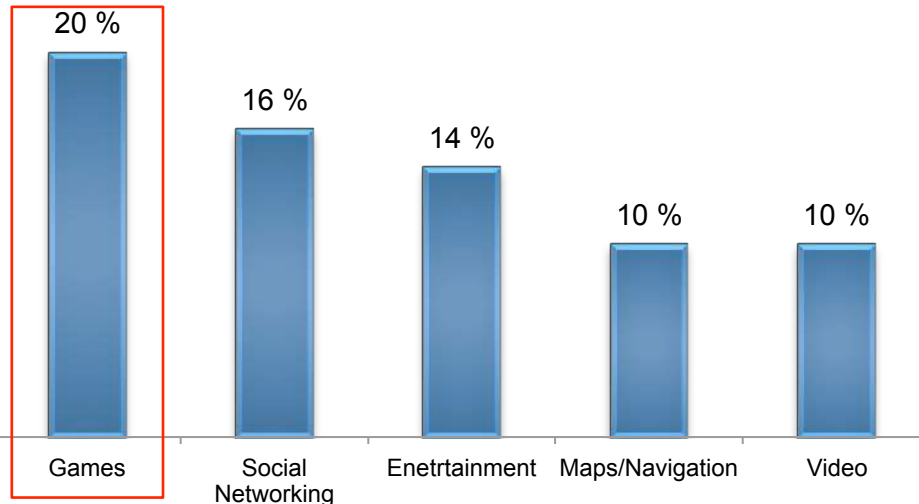
Gamification Market, Global, 2012-2020, ($ billion)

- 2012: 0,2
- 2013: 0,4
- 2014: 0,9
- 2015: 1,8
- 2016: 3,2
- 2017: 4,9
- 2018: 6,6
- 2019: 7,5
- 2020: 8,3

Sub Trend: Big Data Analytics
90% of the data in the world has been created in the last two years alone

Global Data Traffic to Cross 100 Zettabytes annually by 2025

2010 2015 2020 2025

Global Big Data Market to generate a revenue of over $122 billion by 2025
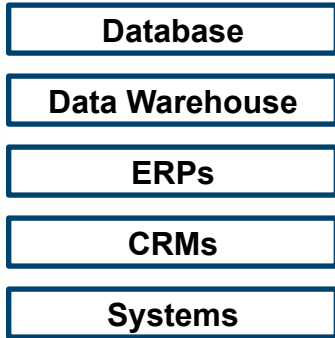
2010 2015 2020 2025
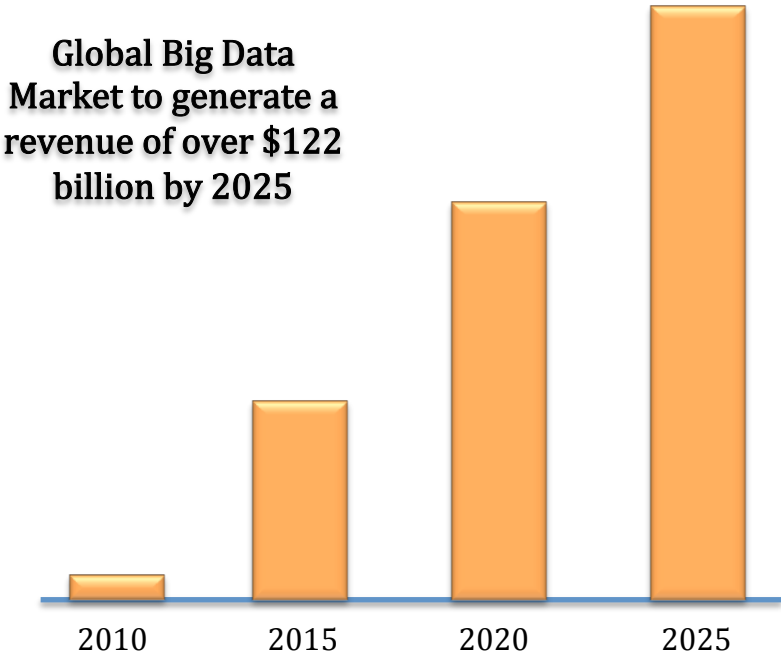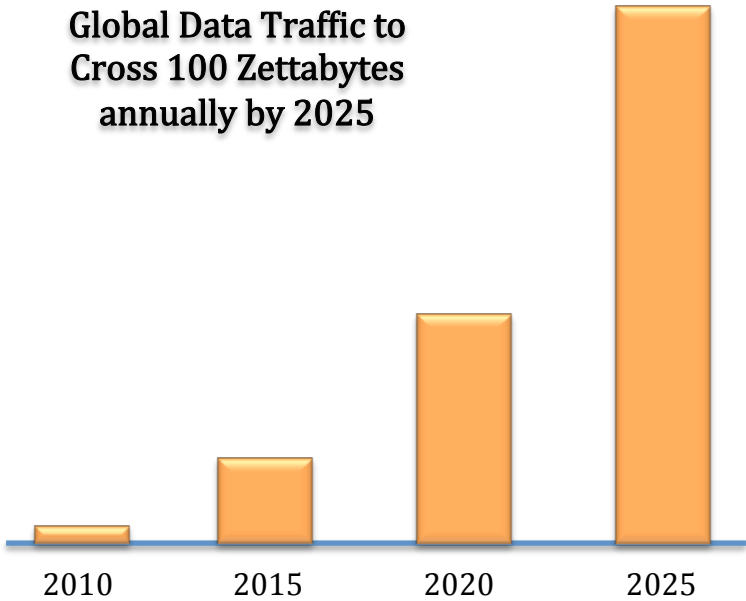
Source: IBM, Cisco, Frost & Sullivan Analysis

Big Data Deluge
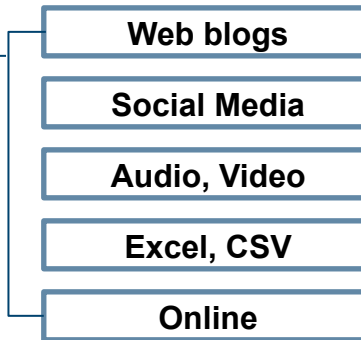## Digital content is doubling every 18 months
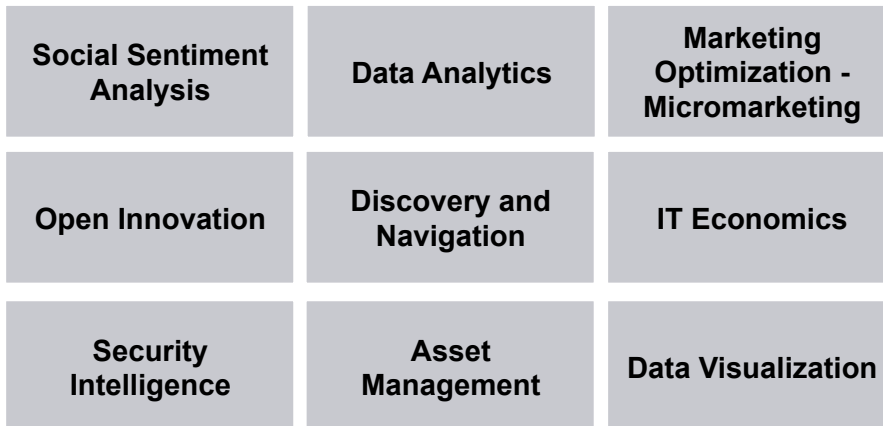
Big Data, Sources & Types of Services, 2014

Structured Data

- Database
- Data Warehouse
- ERPs
- CRMs
- Systems

Big Data

Unstructured Data

- Web blogs
- Social Media
- Audio, Video
- Excel, CSV
- Online

Data Traffic per Year, Global, 2012 and 2020

Big Data is growing at 40% annually

+40% / Year

1.2 Zettabyte

100.2 Zettabyte

2012

2020

Types of Data-Enabled Services

Social Sentiment Analysis	Data Analytics	Marketing Optimization - Micromarketing
Open Innovation	Discovery and Navigation	IT Economics
Security Intelligence	Asset Management	Data Visualization
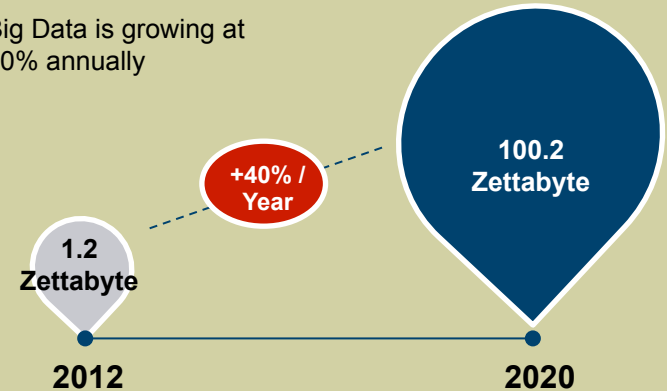
Big Data Creates New Value Propositions for Businesses

Cloud-connected cars

Nissan is looking at analytics on sensor data and telematics to improve self-diagnostics

Facebook Personalized Marketing

Facebook analyses location data to reach more customers with personalized, targeted products

Smart Factories

Pepsi's Latin American division merged customer, logistics, and manufacturing data to significantly improve its plant operations

Emergency Responses

During Superstorm Sandy, 2012, Twitter hashtags were analysed to find out where power, fuel, food and water were urgently needed.

Source: IBM, Cisco, Frost & Sullivan Analysis

Implication: Connectivity Is Pushing Convergence

Connectivity will Accelerate Convergence of Industries, Products, Technologies and Competition

① INDUSTRIES	**Space Industry**	**Solar Industry**	**Space Based Solar Power**
② PRODUCTS	**Car**	**Unmanned Technology**	**Autonomous Cars**
③ TECHNOLOGIES	**Building Technologies**	**Smart Automation**	**Smart Home Hubs**
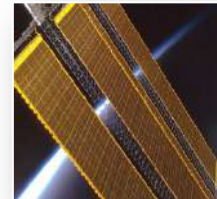
Image Source:: `Creative Commons and Dreamstime.

Source: Frost & Sullivan analysis

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Convergence is Driving Unconventional Players to Contest for New Markets!

- Google - Nest , Titan Aerospace

- Amazon - Dash, Fire TV

- Facebook – Oculus, Connectivity Labs

Smart is the New Green
3 Levels of Smart Products and Technologies

A **smart product** is characterized by **an intelligent sensing technology** that is increasingly being integrated with Internet technologies, thereby allowing the product **to react to and communicate** with the changing environment around it. This leads to **optimal operations and improvement in efficiency.**

Basic Sensing Mechanism

LEVEL 1

Smart Bandages

Basic Sensing Mechanism + One-way Data Communication

LEVEL 2

Smart Chip

Smart Lighting

Sensing Mechanism + Two-way Flow of Data Communication

LEVEL 3

Smart Clouds

Smart Windows

Smart Mobility

Smart Technology

Smart Buildings

Smart cities To Create Huge Business Opportunities With A Market Value Of $1.5 Trillion By 2020

Smart City Market by Segments,[1] Global 2020

Smart Building
CAGR: 8.8% (2012-2020)

Smart Healthcare
CAGR: 6.9% (2012-2020)

Smart Transportation
CAGR: 14.8% (2012-2020)

Smart Infrastructure[3]
CAGR: 8.9% (2012-2020)

7 — 10,21

6 — 15,26

5 — 9,09

4 — 13,75

1 — 20,93

2 — 14,11

3 — 16,65

1 Smart Governance and Smart Education[2]

2 Smart Security
CAGR: 14% (2012-2020)

3 Smart Energy
CAGR: 19.6% (2012-2020)
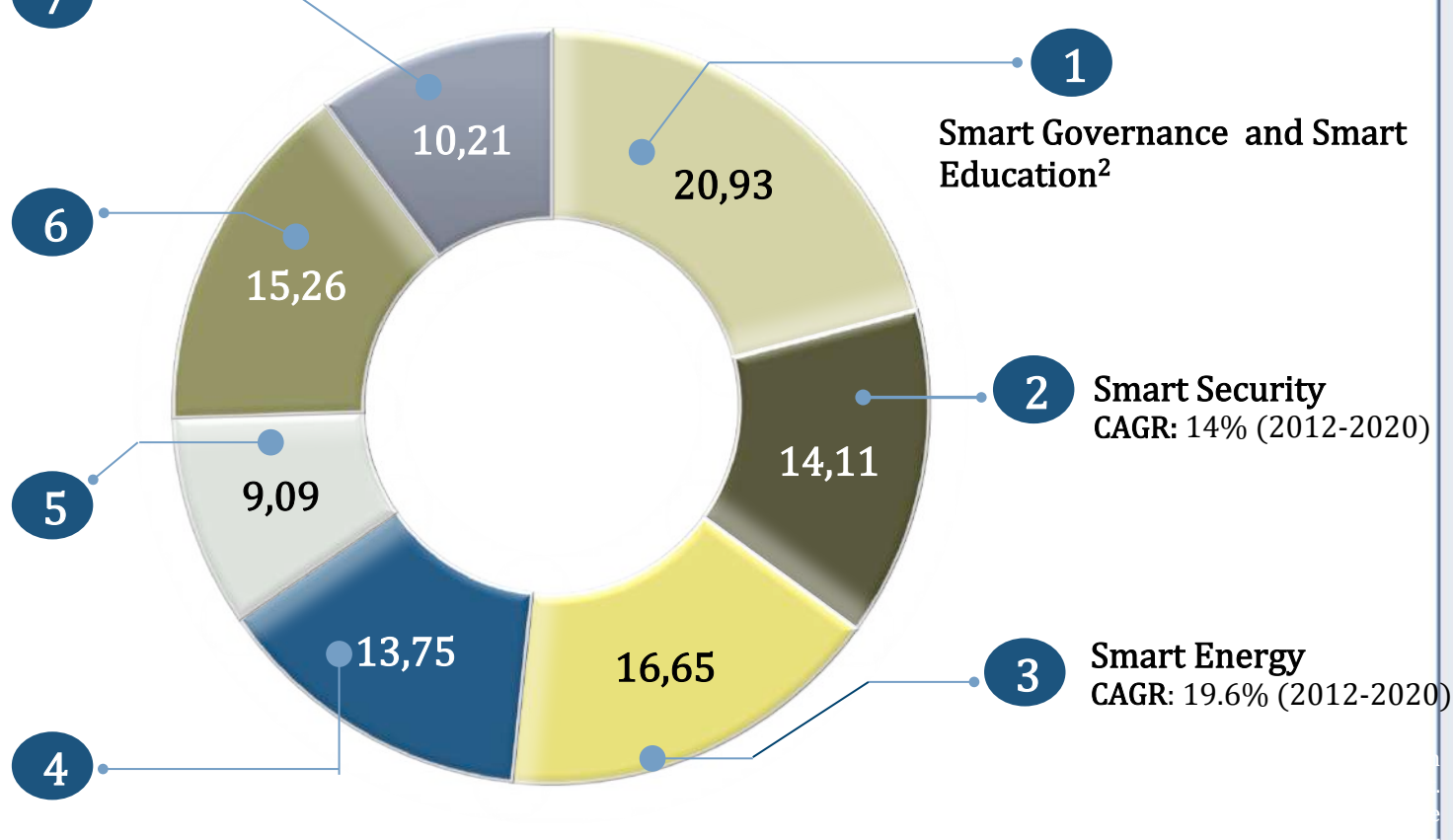
[2] Smart Education includes eLearning services for schools, universities, enterprises, and government

Global Smart Cities in 2025

More than 26 global cities will be Smart Cities in 2025, and more than 50% of which will be from Europe and North America.

Smart Cities, Global, 2025

Vancouver

Calgary

Amsterdam

Copenhagen

Beijing

Tokyo

Seattle
San Francisco
Los Angeles
San Diego
Chicago
Toronto
Boston
New York

Oslo
Stockholm
Helsinki
Glasgow
London
Berlin
Paris
Vienna
Barcelona
Luxembourg

Chengdu
Tianjin
Seoul
Wuhan
Delhi
Shenzhen

Singapore

Jakarta

Sydney

Johannesburg

- Select Smart City Projects in 2025[1]
- Smart Cities in 2025

[1]This list is not exhaustive. The cities highlighted here have implemented smart city projects in at least one of eight smart city aspects discussed in this study

Sustainable/Eco Cities in 2025

Global Snapshot of Sustainable/Eco Cities in 2025

- Sustainable/Eco City in 2025
- Sustainable/Eco City built from scratch

North America

- Portland
- Sacramento
- Oakland
- San Diego
- Dallas
- Houston
- Orlando
- Austin
- Minneapolis
- San Jose
- Denver
- Boston
- Ottawa
- Montreal
- Philadelphia
- Washington DC
- Columbus
- Edmonton

Europe

Cardiff	Geneva	Manchester	Istanbul
Brussels	Graz	Gothenburg	Bursa
Zurich	Riga	Isle of Wight	Ankara
Lyon	Vilnius	Glasgow	Eskisehir
Frankfurt	Metz	Liverpool	Izmir
Milan	Tubingen	Dublin	Denizli
Rome	Montpellier	Marseille	Antalya
Cambridge shire	Bordeaux	Bergen	Adana
Marseille	Casablanca	Edinburgh	Edinburgh
Tampere	Norwich	Nantes	
	Hamburg	Gyor	

Middle East and Africa

- Accra
- Johannesburg
- Cape Town
- Durban
- Tunis
- Masdar City
- Doha

Latin America

- Belo Horizonte
- Bogotá
- Brasília
- Rio de Janeiro
- São Paulo
- Curitiba
- Mexico City

Asia-Pacific & Australia

- GIFT
- Sino-Singapore Tianjin Eco-city, Tianjin
- Nanjing
- Hong Kong
- Foshan
- Guangzhou
- Wuxi
- Osaka
- Yokohama
- Wanzhuang Eco-city, Hebei
- Medan
- Palembang
- Jakarta
- Surabaya
- Denpasar
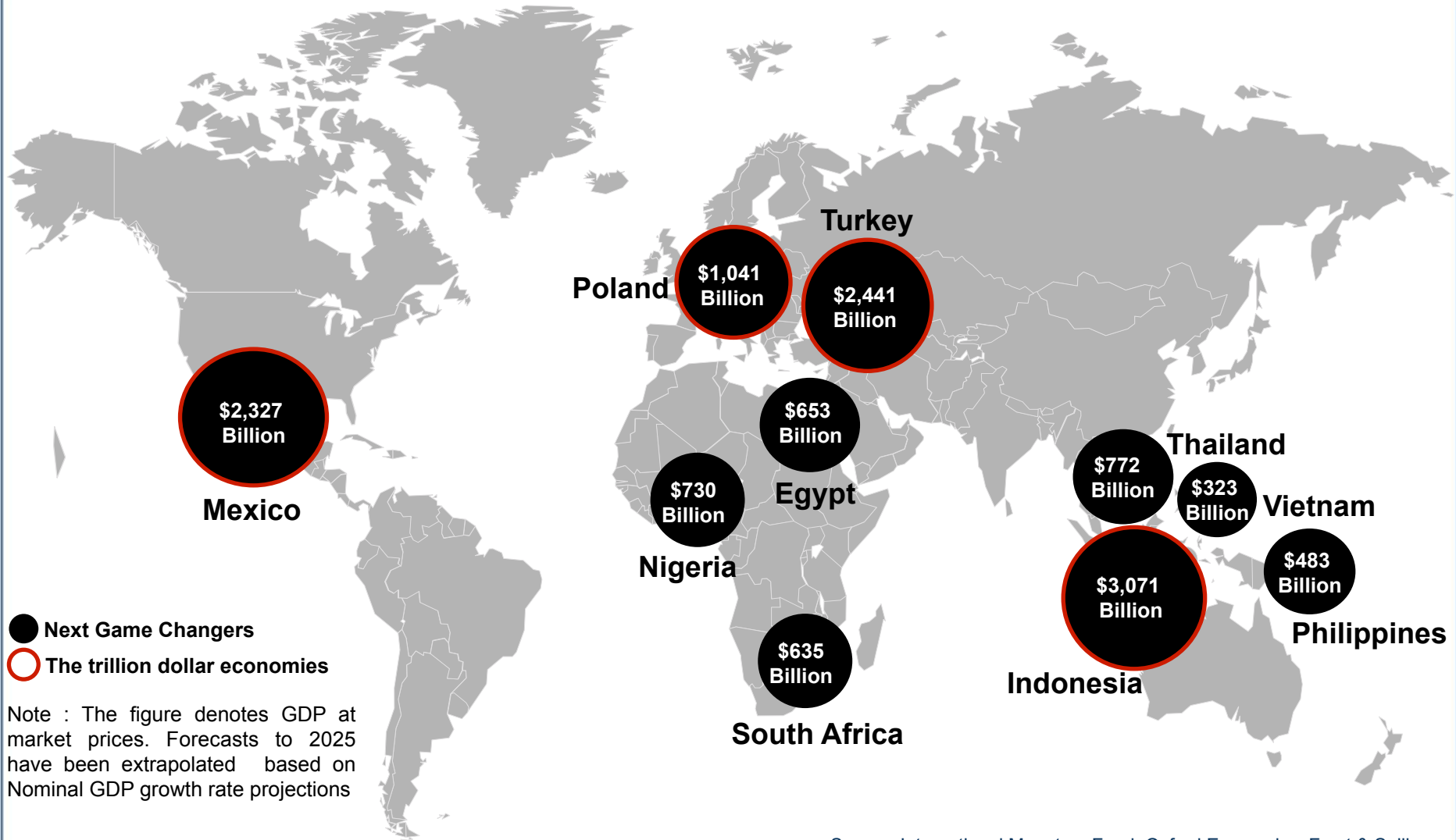- Makasar
- Balikpapan
- Adelaide
- Moreland

Note: Eco Cities are cities built on a green initiative, from buildings to transport, governance, city planning, energy, and technology. These cities are either upgraded or built from scratch.

The Next Game Changers in 2025 (Beyond BRICSs)

High GDP growth, improved FDIs, and rapid industrialization to give rise to a new lot of emerging countries, beyond BRIC nations, that contend to become next decade's economic leaders
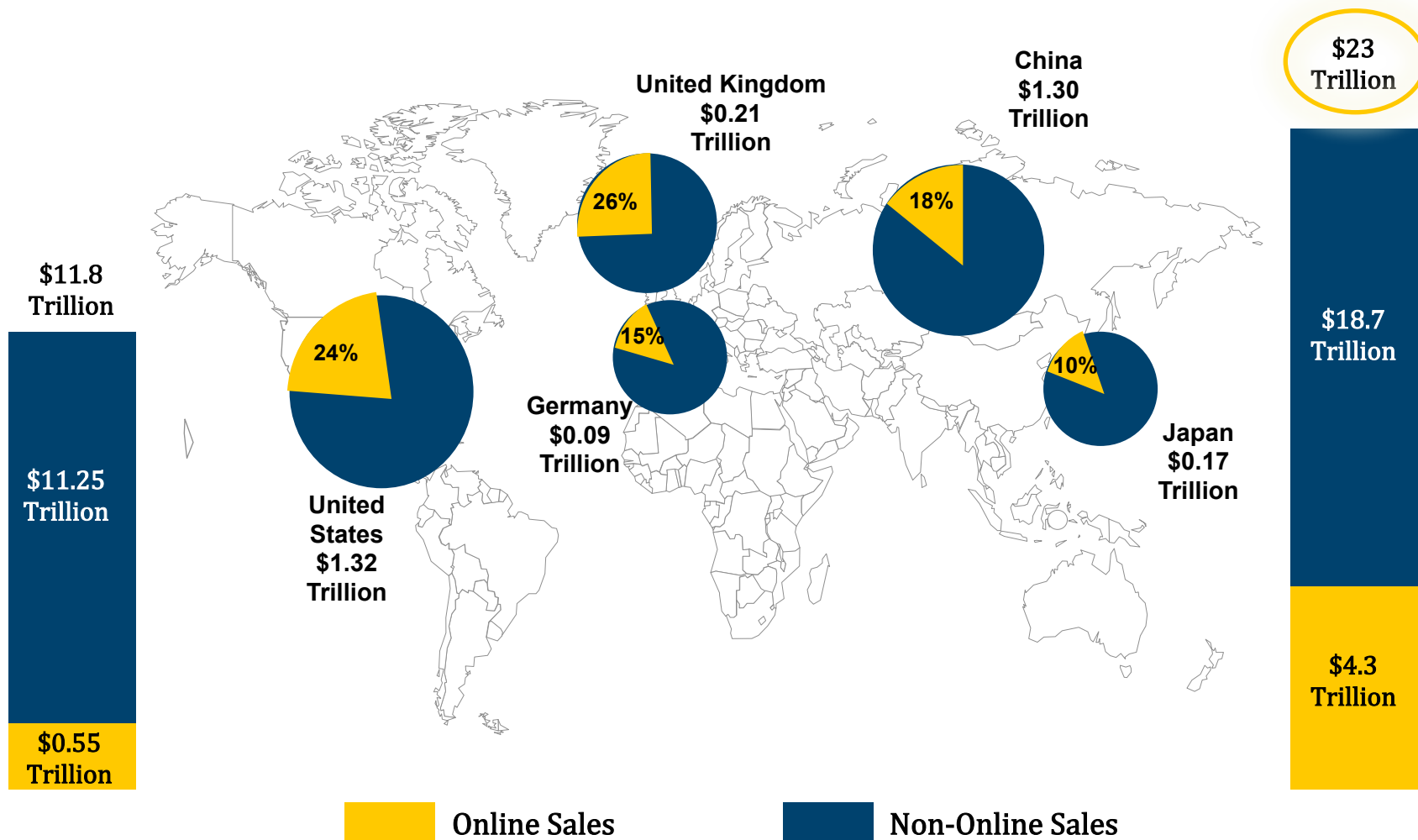

Poland: **$1,041 Billion**

Turkey: **$2,441 Billion**

Mexico: **$2,327 Billion**

Egypt: **$653 Billion**

Nigeria: **$730 Billion**

Thailand: **$772 Billion**

Vietnam: **$323 Billion**

Philippines: **$483 Billion**

Indonesia: **$3,071 Billion**

South Africa: **$635 Billion**

● Next Game Changers

⭕ The trillion dollar economies

Note : The figure denotes GDP at market prices. Forecasts to 2025 have been extrapolated based on Nominal GDP growth rate projections

Source: International Monetary Fund. Oxford Economics, Frost & Sullivan,

New Business Models

	Examples	
B2C	**Co-Creation** (Eg. Quirky.com) On-Demand Services **Digital Media / Online Streaming Collapsing** **Video Rentals: eg. Netflix**	**Pay as you Go Insurance** **Value for Many** • (Low Cost Models - Tata Nano) • Group Buying (Groupon) • Micro Financing
B2B	**Online Platforms** • E Rental (Workspaces) • E Distribution (eg. Deliv) • E Exchanges • Hypermarkets • E-Travel: Concur **Sharing: Corporate Car Sharing**	**Alliance Based Models** **Integrator Models** (IBM Smarter Planet) **Online Stock Trading – traditional brokers**
P2P/ C2C	**Online Retail** (Eg. Ebay) • E-Auction (eg. Taobao)	**Sharing – Car Sharing** **Peer-to-peer lending**
G2B	**Open Business Model** (Online Bidding of Projects) – (e.g Chicago Open Data Model)	**PPP -** BOO, BOT, BOM
G2G	E-Records, E-Consultancy - (e.g G2G Information System like NEGIS)	

Future of Clicks in Retail Industry

Global Online Retail Sales To Reach $4.3 Trillion By 2025 Accounting for 19% of Total Retail

$11.8 Trillion

$11.25 Trillion

$0.55 Trillion

United States $1.32 Trillion — 24%

United Kingdom $0.21 Trillion — 26%

Germany $0.09 Trillion — 15%

China $1.30 Trillion — 18%

Japan $0.17 Trillion — 10%

$23 Trillion

$18.7 Trillion

$4.3 Trillion

Online Sales — Non-Online Sales

Case Study: Audi City London - First Digital Car Showroom

Example of Future Digital Car Showrooms that will be "Unlimited", Personalised, Socially Connected and Digitally Integrated

Fully Digital, Retail-Style Cyberstore

One-stop Experience for Entire Model Range

Highly personalized customer dialogue

Gamification, Augmented Reality Offers Tailor-made services

Specially Trained Dealer Personnel Interactivity

London Flagship Store

Virtual Stores—New Generation of Grocery Shopping

Virtual stores are simulated brick and mortar stores that offer interactive shopping in public places by creating virtual products, which buyers can buy and order using their Smartphones.
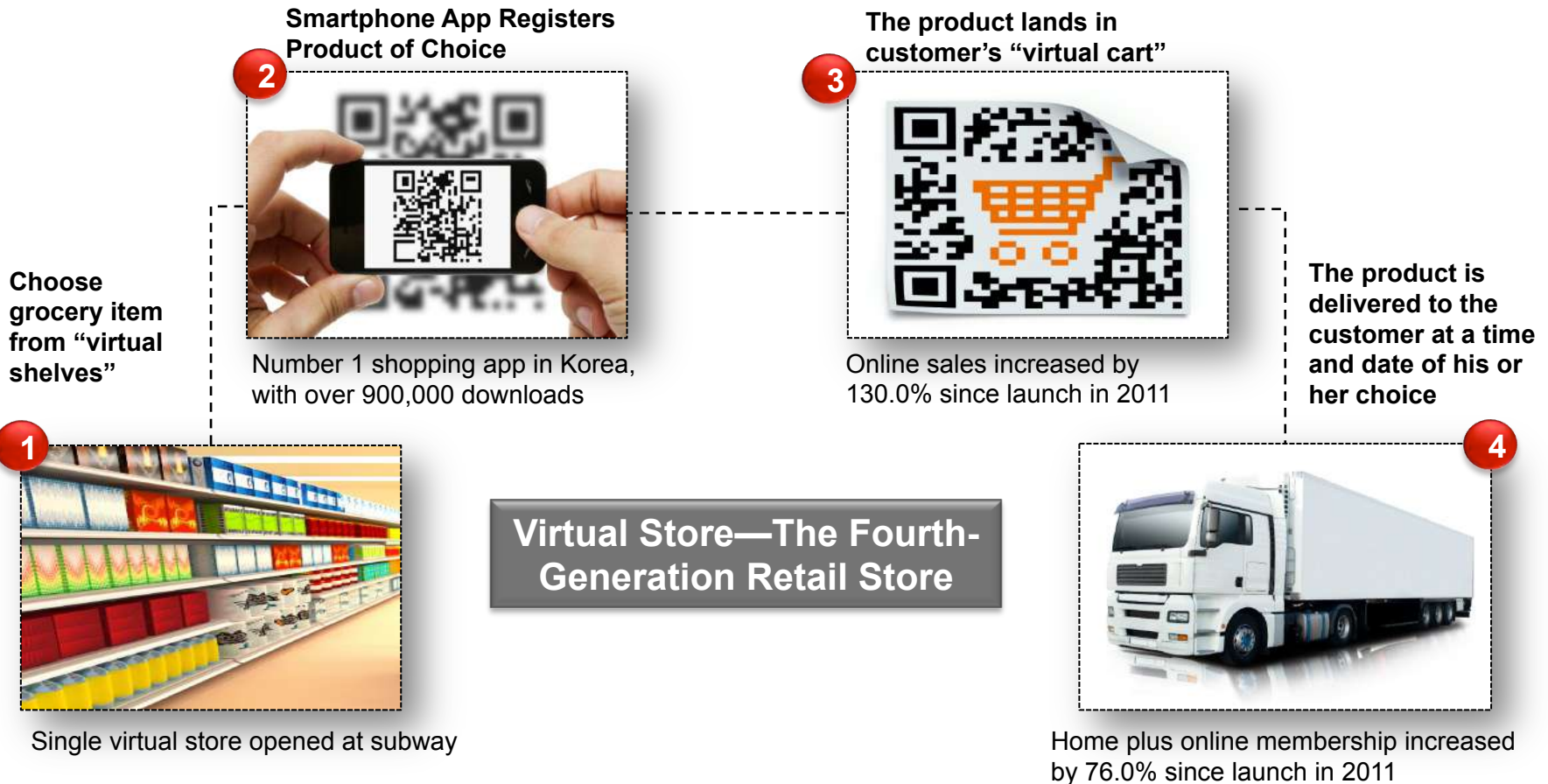
Tesco's Subway Virtual Store

Smartphone App Registers Product of Choice

2

The product lands in customer's "virtual cart"

3

Choose grocery item from "virtual shelves"

Number 1 shopping app in Korea, with over 900,000 downloads

Online sales increased by 130.0% since launch in 2011

The product is delivered to the customer at a time and date of his or her choice

4

1

Virtual Store—The Fourth-Generation Retail Store

Single virtual store opened at subway

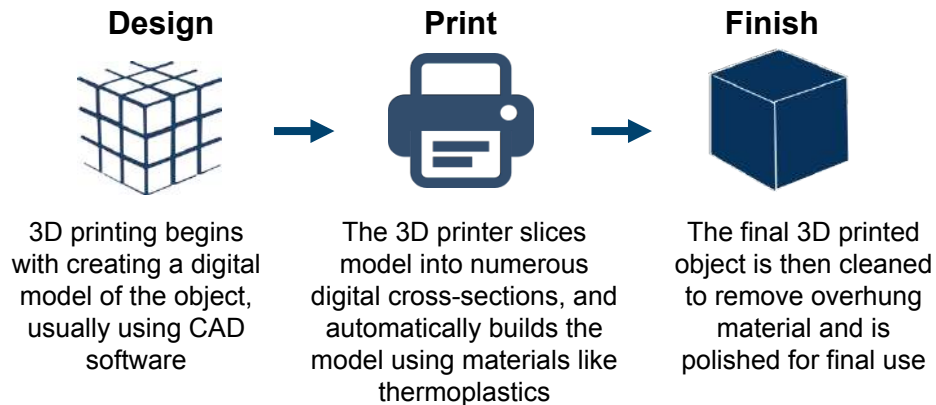Home plus online membership increased by 76.0% since launch in 2011

Image Source: iStockphoto and Dreamstime   Source: Frost & Sullivan analysis.

3D Printing

The consumer and commercial products are expected to account for 28% of 3D printing revenues by 2020

3D printing is a computer-driven additive manufacturing technology used for producing the final product from a digital model by laying down successive layers of material.

Design

3D printing begins with creating a digital model of the object, usually using CAD software

Print

The 3D printer slices model into numerous digital cross-sections, and automatically builds the model using materials like thermoplastics

Finish

The final 3D printed object is then cleaned to remove overhung material and is polished for final use

3D Printed Products in Key Industries

- Human Organs
- Medical Devices
- Body Tissues
- Nano-medicine
- Pharmaceuticals

Healthcare

- Concept Modeling
- Prototypes
- Spare Parts
- End-use Parts
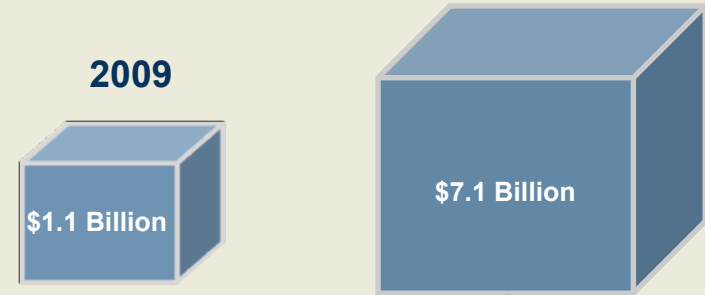- Tooling

Automotive

- Manufacturing On-demand
- Cutting Tools
- Customization
- Domestic Production

Manufacturing

Global 3D Printing Market, Segment Breakdown, 2009 and 2020

Total Market ($Billion)

2009

$1.1 Billion

2020

$7.1 Billion

By Industry (% Share)

- Consumer & Commercial
- Automotive
- Architecture
- Industrial Application
- Aerospace & Defense
- Medical and Dental
- Other

Consumer & Commercial: 28 %
Automotive: 20 %
Architecture: 4 %
Industrial Application: 12 %
Aerospace & Defense: 15 %
Medical and Dental: 16 %
Other: 5 %
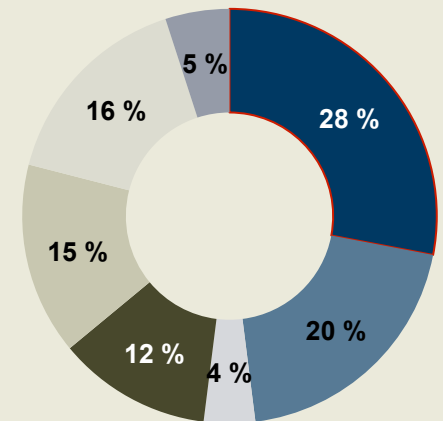
Source: Frost & Sullivan Analysis

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Rise of the Robots

Robots priced between $1,566 and $4,699 could enter our personal lives commercializing the personal robots market by 2020

Commercialization of Robotics
Steep fall in personal robots ownership prices from $150,000 to $1,000

ASIMO = $150,000

- Non-commercial
- Not for sale
- Available only on lending basis

LUNA = $1,000

- Commercial
- Currently available on auction basis
- Expected to retail between $1,000 and $3,000

2004 — **2013**

Global Personal Robots Market

2010	2020

$17.39 billion

$1.29 billion

Robots at Home (Personal Robot Applications)

 Robotics for Elderly Care: Assisted Living

 Robots as Teaching Assistants

 Robots for household care

 Robots as Nannies
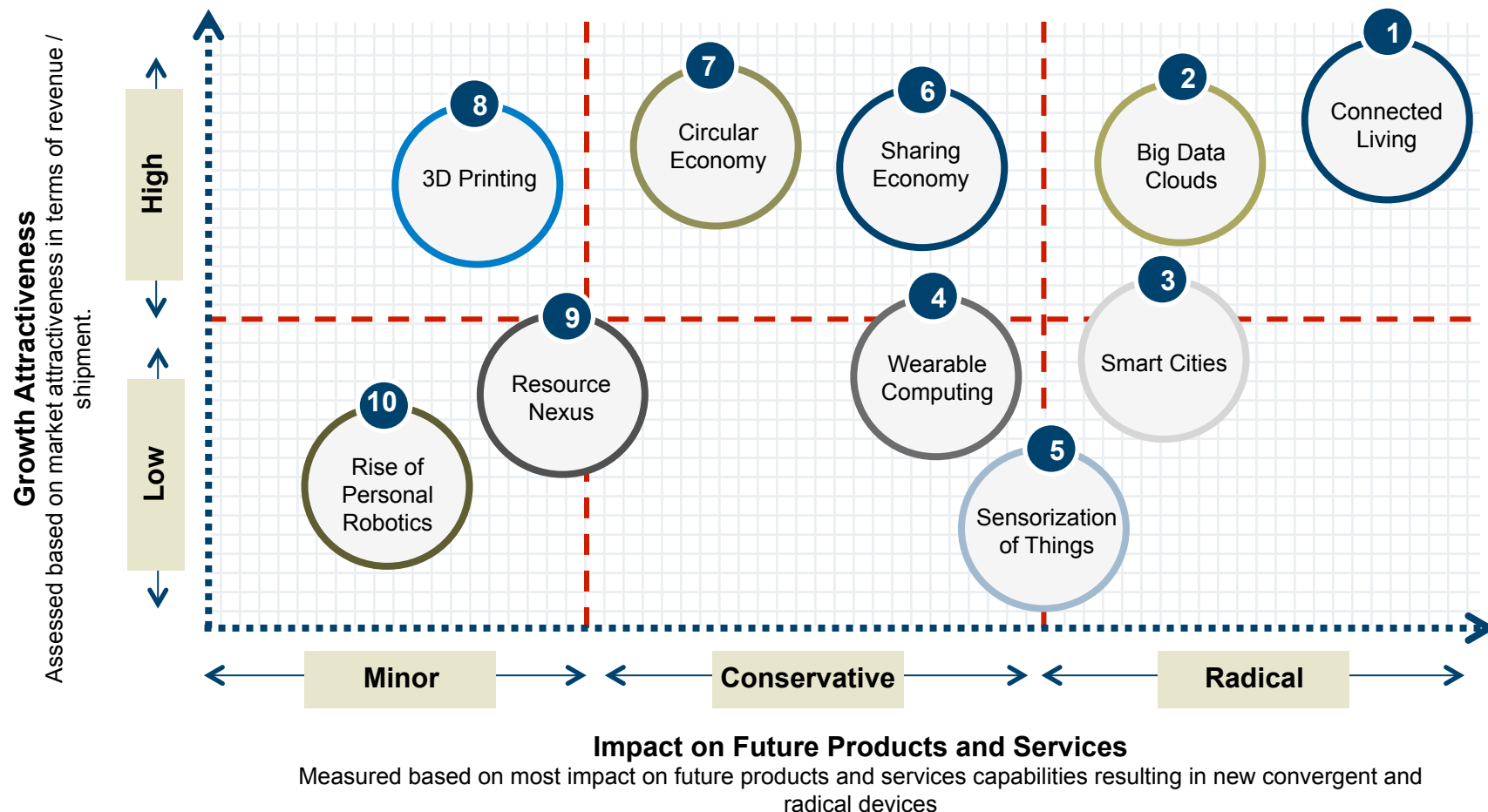
 Robots for companionship

 Robots as personal assistants

Source: Frost & Sullivan Analysis

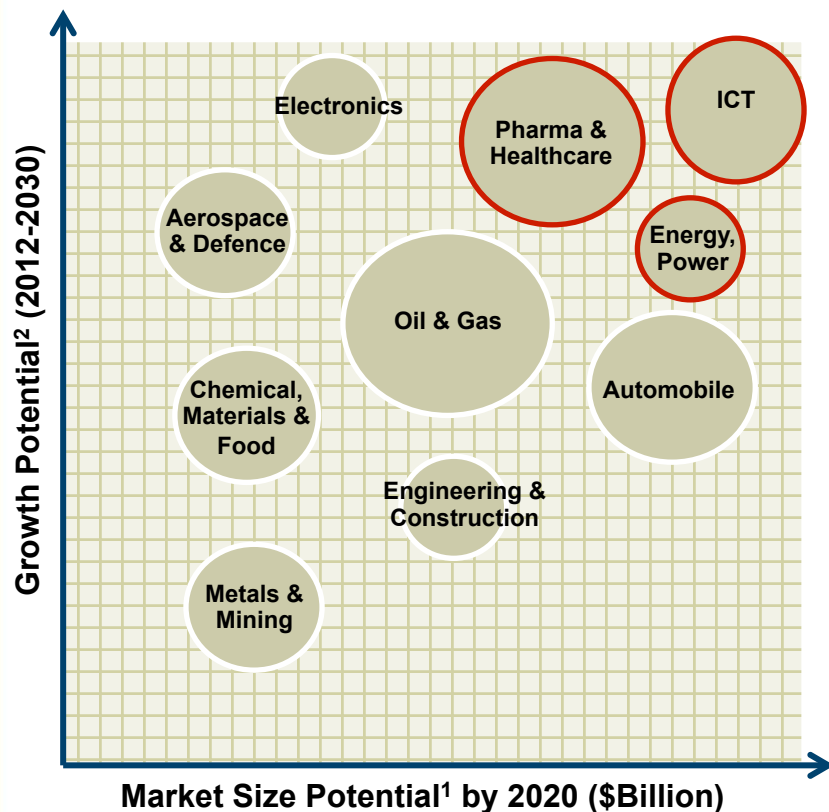# Executive Summary – Top Ten Transformational Shifts by 2020

While all Mega Trends are important, the selection and raking of these trends indicate which seismic shifts will have particular relevance in shaping the landscape in which the world will evolve this decade.
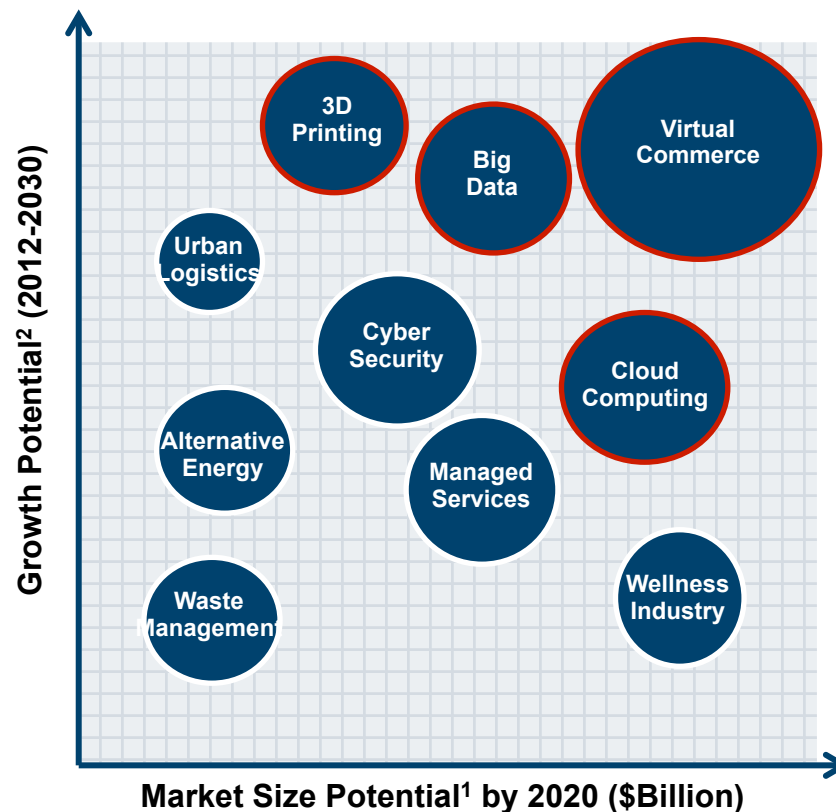
Growth Attractiveness
Assessed based on market attractiveness in terms of revenue / shipment.

High / Low

- 8 — 3D Printing
- 7 — Circular Economy
- 6 — Sharing Economy
- 2 — Big Data Clouds
- 1 — Connected Living
- 9 — Resource Nexus
- 4 — Wearable Computing
- 3 — Smart Cities
- 10 — Rise of Personal Robotics
- 5 — Sensorization of Things

Minor | Conservative | Radical

Impact on Future Products and Services
Measured based on most impact on future products and services capabilities resulting in new convergent and radical devices

Source: Frost & Sullivan analysis.

Top Industries of the Future

Top Mature Industries by 2020

Growth Potential[2] (2012-2030) (vertical axis)

Market Size Potential[1] by 2020 ($Billion) (horizontal axis)

Bubbles: Electronics, Pharma & Healthcare, ICT, Aerospace & Defence, Energy, Power, Oil & Gas, Automobile, Chemical, Materials & Food, Engineering & Construction, Metals & Mining

Top Emerging Industries by 2020

Growth Potential[2] (2012-2030) (vertical axis)

Market Size Potential[1] by 2020 ($Billion) (horizontal axis)

Bubbles: 3D Printing, Big Data, Virtual Commerce, Urban Logistics, Cyber Security, Cloud Computing, Alternative Energy, Managed Services, Waste Management, Wellness Industry

[1]Relative score assigned for potential annual turnover (revenue / shipment) of the industry in 2025

[1]Measured by qualitative factors that has the scope to create a boom in the industry such as new patents, innovation   cycle and industry impact

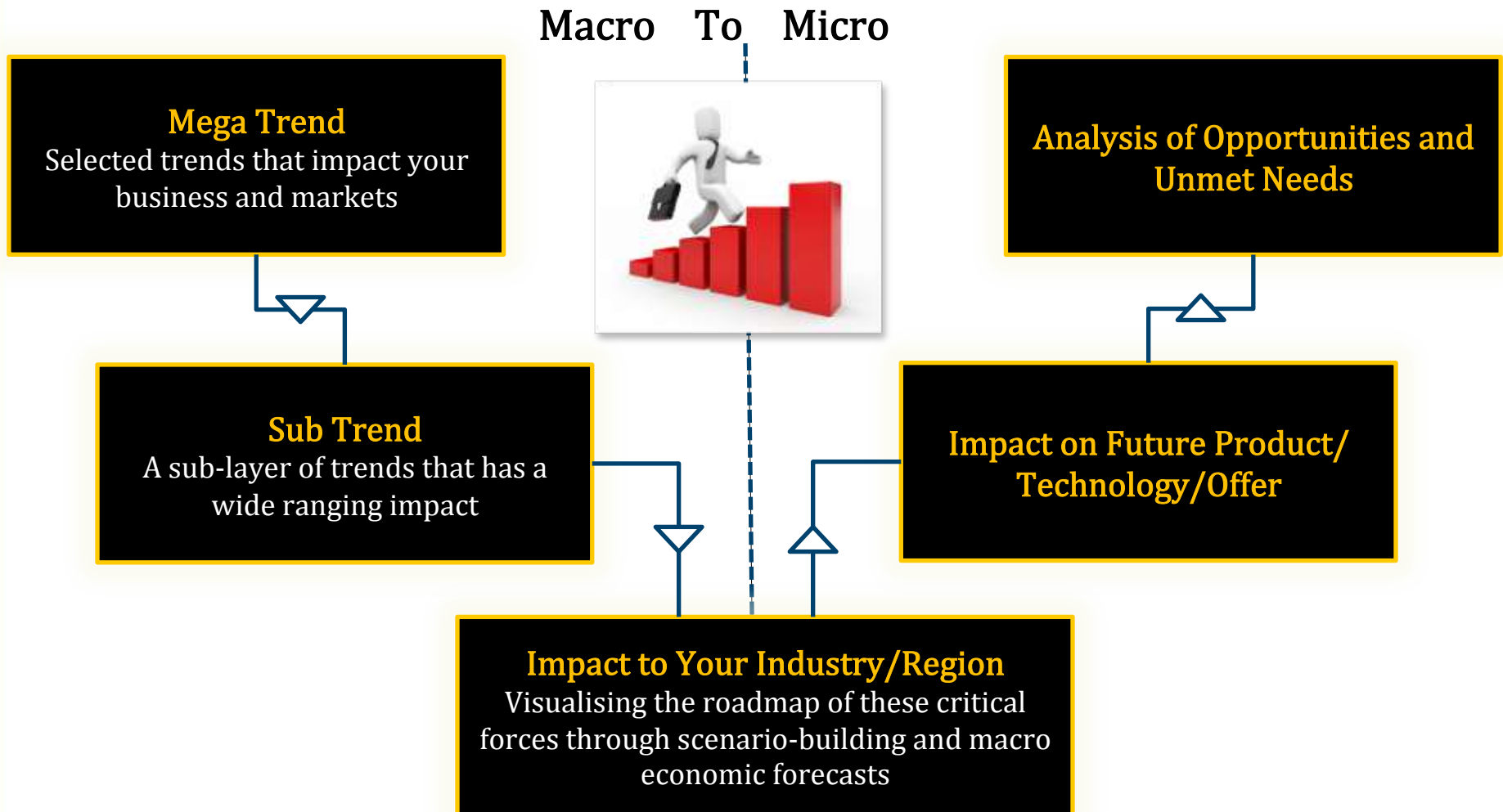Source: Bloomberg, Frost and Sullivan Analysis

Some Key Strategic Challenges

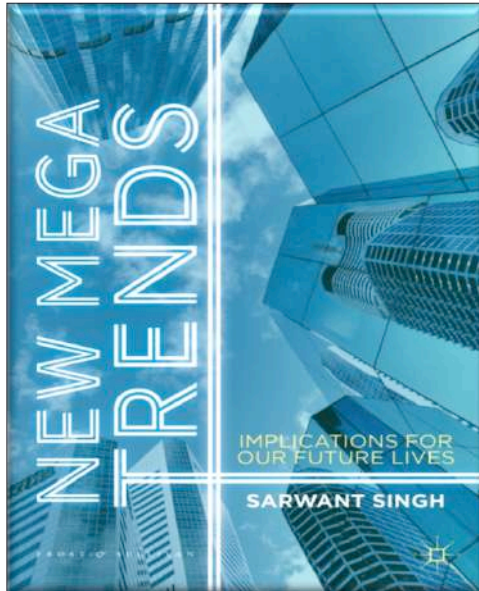| 1	**(Fair) Trade**	Providing social premium for community development projects; Balance between self-reliance and global market integration; Fostering export dependency
2	**Collaborative Ecosystem**	Shift from social intranet to online collaborative workspaces; Directly embedding collaborative processes to improve the speed and quality of their decisions
3	**Economic Shifts**	Changes in business strategies; China and India to lead the global economy in the near future; Looking Beyond BRICS
4	**The Retail Issue**	Look at internet retailing; look at the format of your retailing offer and how this fits into new trends for micro solutions driven by convenience
5	**Complexity Management**	New value chain partnerships; Integration of product innovations; Facing the impact of adjacent markets
6	**Sustainable Development**	Incorporation of increased interdisciplinary planning; Adopting new business models for collective ownership
7	**Where You Live**	Is your City 'Smart' or 'Sustainable'; What are your City Planning Policies ?
8	**Government Inhibition**	Focus on public-based solutions; Reduced foreign direct investments;
9	**Sustainable and Livable Cities**	Need for more green initiatives; demand for carbon neutral energy production and advanced spatial planning and urban design solutions
10	**Organizational Changes**	Need for more integrated solutions; Dynamic and flexible working practices; exterior innovations; structural changes

Source: Frost & Sullivan

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From Macro to Micro: Taking Mega Trends from Information to Strategy Implementation

Macro   To   Micro

Mega Trend
Selected trends that impact your business and markets

Analysis of Opportunities and Unmet Needs

Sub Trend
A sub-layer of trends that has a wide ranging impact

Impact on Future Product/ Technology/Offer

Impact to Your Industry/Region
Visualising the roadmap of these critical forces through scenario-building and macro economic forecasts

Learn More About "New Mega Trends"

New Mega Trends
Implications for our Future Lives
By Sarwant Singh

Publisher: Palgrave Macmillan
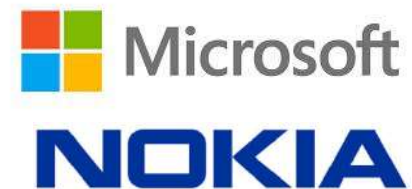http://www.palgrave.com/products/title.aspx?pid=577423

Join Our Mega Trend Group On **Linked** in

Mega Trends: Strategic Planning and Innovation Based on Frost & Sullivan Research

Mega Trending on My Trip to Helsinki.....

Thank You !

F R O S T *&* S U L L I V A N

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Director Strategic Partnerships

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✉ Iain.jawad@frost.com

"We Accelerate Growth"