

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

**Mega
Trends**

Defining Our Future:
Are You Ready?

Global Mega Trends & Innovation Trends and Implications to Business, Society and Cultures

September 2015

About Frost & Sullivan



Growth Learning Solutions

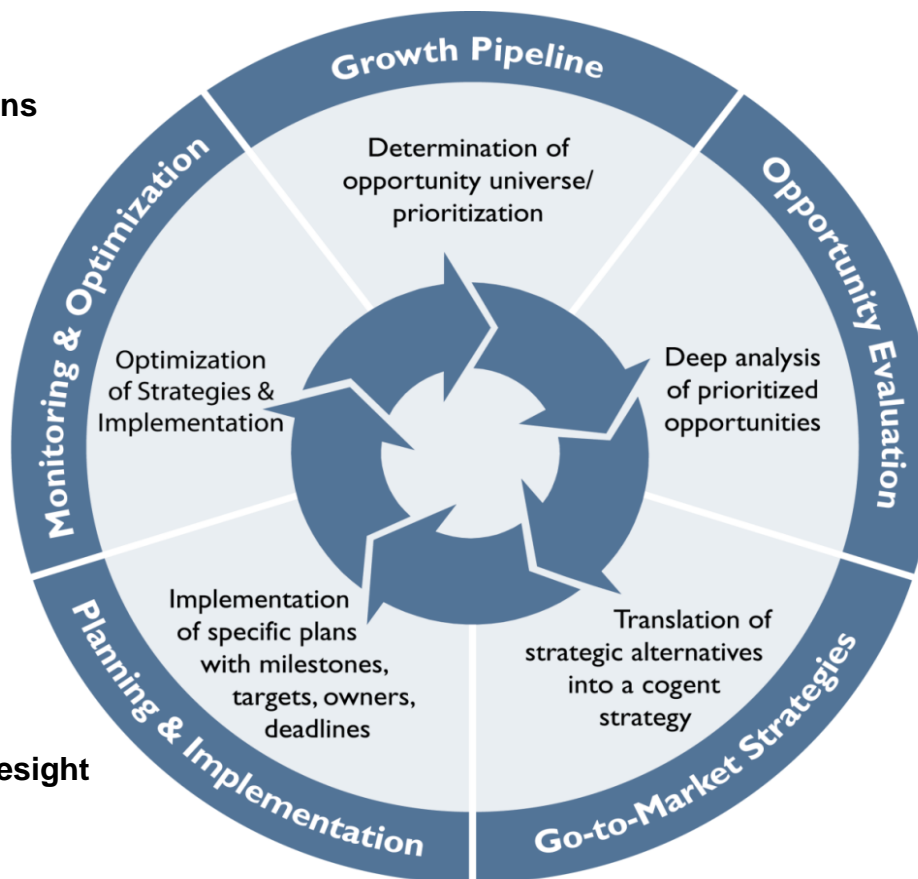


Growth Implementation



Technology Insight & Foresight

Serving our Clients Through the Growth Cycle



Market Research



**Mega Trends
Visionary Innovation**



Growth Consulting

Mega Trends

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-
economy,
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.

News Headlines in 2025

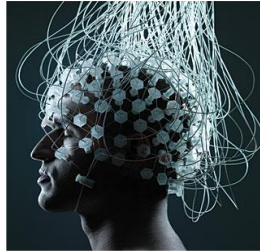


Robots have entered our homes for personal use.

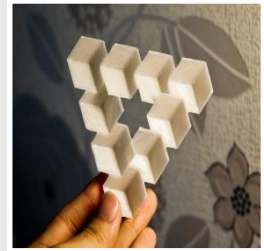


Big data has entered the Zettabyte era.

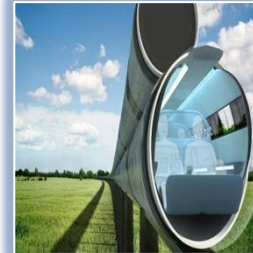
Sensory devices guide our everyday lives.



**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.



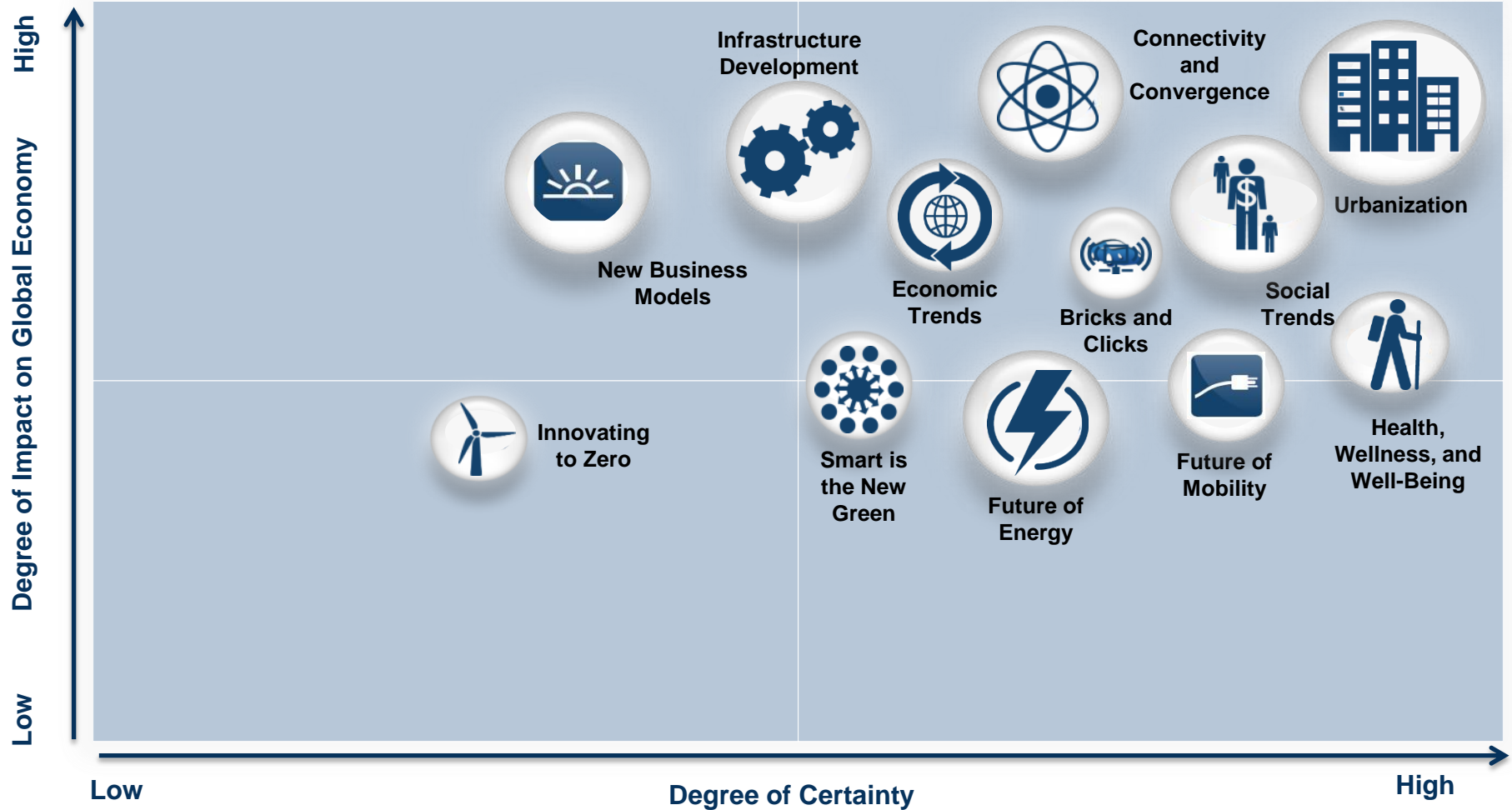
Summer Sale: Low-cost holidays in space.



The Mega Trend Matrix

Understanding Implications of Key Mega Trends on Global Economy

Mega Trend Matrix, Global, 2025



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

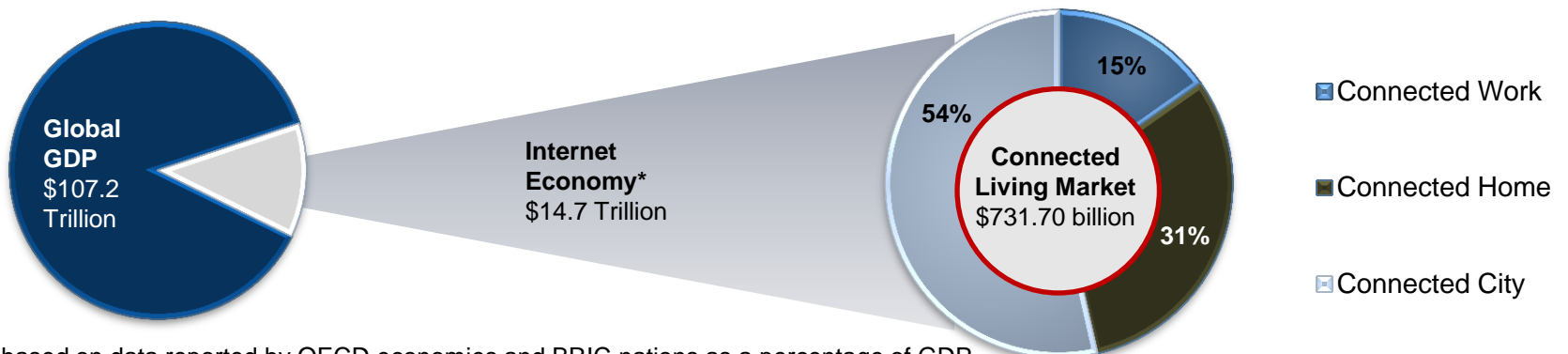
Transformational Shift #1 - Connected Living

Digital solutions for a connected life expected to create a market potential of \$731.70 billion by 2020

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 Market Potential, 2020



*Average based on data reported by OECD economies and BRIC nations as a percentage of GDP.

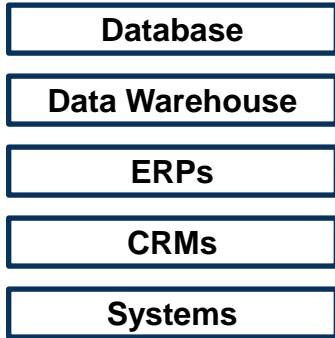
Source: Frost & Sullivan analysis.

Transformational Shift #2 – Big Data Deluge

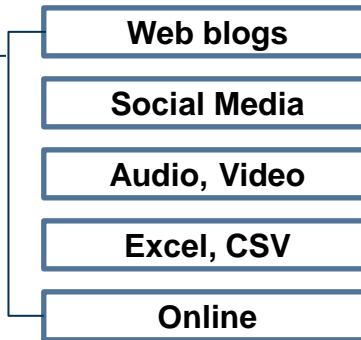
Digital content is doubling every 18 months - 90% of the data in the world today has been created in the last two years alone

Big Data, Sources & Types of Services, 2014

Structured Data



Unstructured Data

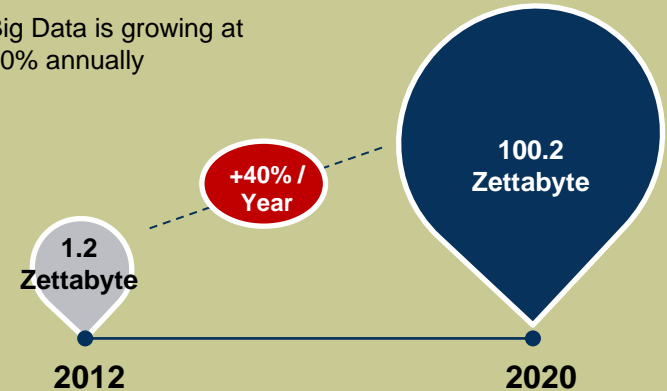


Types of Data-Enabled Services

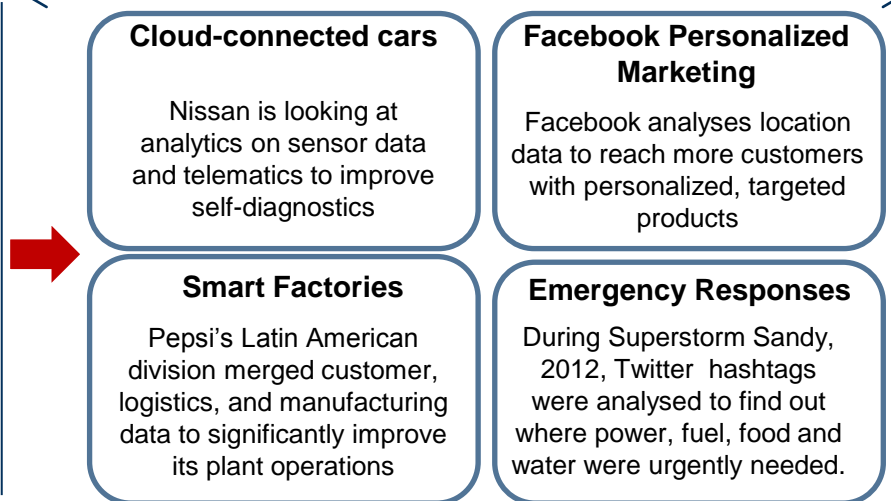
Social Sentiment Analysis	Data Analytics	Marketing Optimization - Micromarketing
Open Innovation	Discovery and Navigation	IT Economics
Security Intelligence	Asset Management	Data Visualization

Data Traffic per Year, Global, 2012 and 2020

Big Data is growing at 40% annually



Big Data Creates New Value Propositions for Businesses



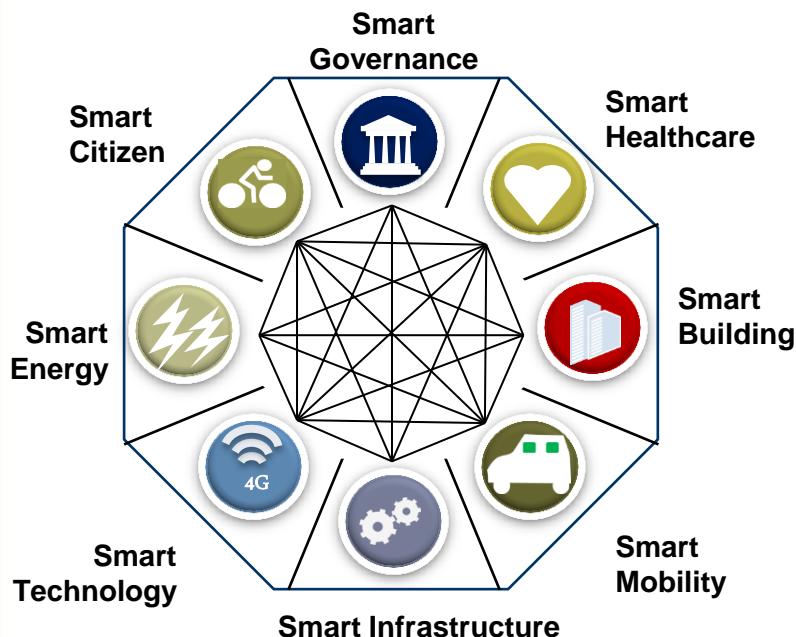
Source: IBM, Cisco, Frost & Sullivan Analysis

Transformational Shift #3 – Smart Cities

Smart cities to create huge business opportunities with a market value of \$1.565 trillion by 2020

Smart cities are cities built on “**Smart**” and “**Intelligent**” solutions and technology that will lead to adoption of at least 5 out of the 8 following smart parameters. Smart energy, Smart building, Smart mobility, Smart healthcare, Smart infrastructure, Smart technology, Smart governance and Smart citizens

Smart Diamond to define Smart city

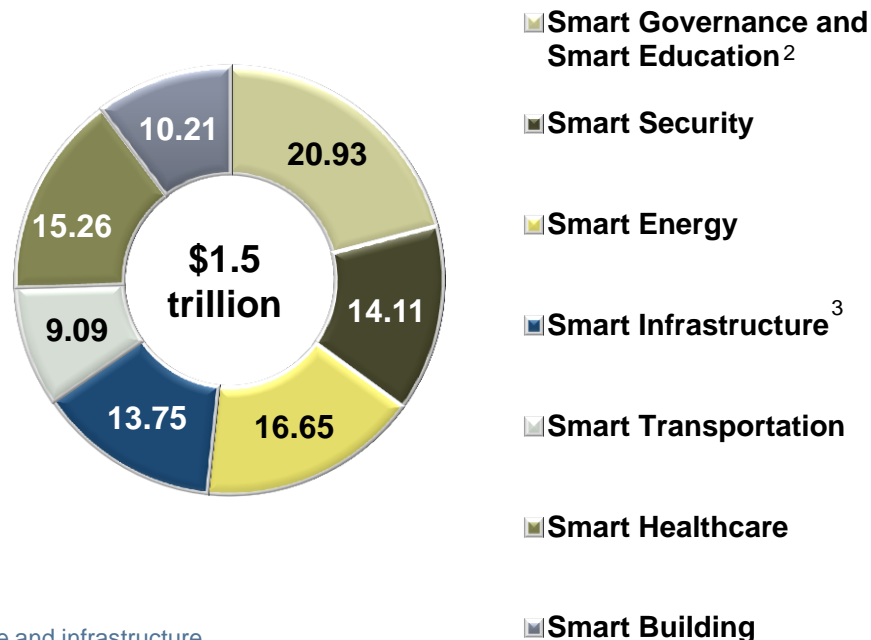


1 Smart citizen and smart technology is covered in other segments such as governance and infrastructure

2 Smart Education includes eLearning services for schools, universities, enterprises, and government entities.

3 Smart Infrastructure includes sensor networks, digital management of water utilities not included in other segments.

Smart City Market by Segments¹, Global, 2020



Source: IBM, Cisco, Frost & Sullivan Analysis

Transformational Shift #4 – Wearable Computing

Electronic devices that can be worn by the bearer, incorporating advanced computing technologies

Timeline

2012

Nike Fuel Bands
(Fitness & Healthcare)

2013

Google Glass
(Consumer Electronics)

2014

Samsung Smart Watch
(Consumer Electronics)

2015 (expected)

Apple iWatch
(Consumer Electronics)

- *Future of wearable technology will be characterized by its functionality, design and non-intrusiveness*
- *Wearables are moving away from the face and wrists and onto glasses, clothes and jewellery*



**Wearable Devices
Market (2020)**
\$11.2 Billion

**Wearable
Healthcare
Market (2020)**
\$5.45 Billion

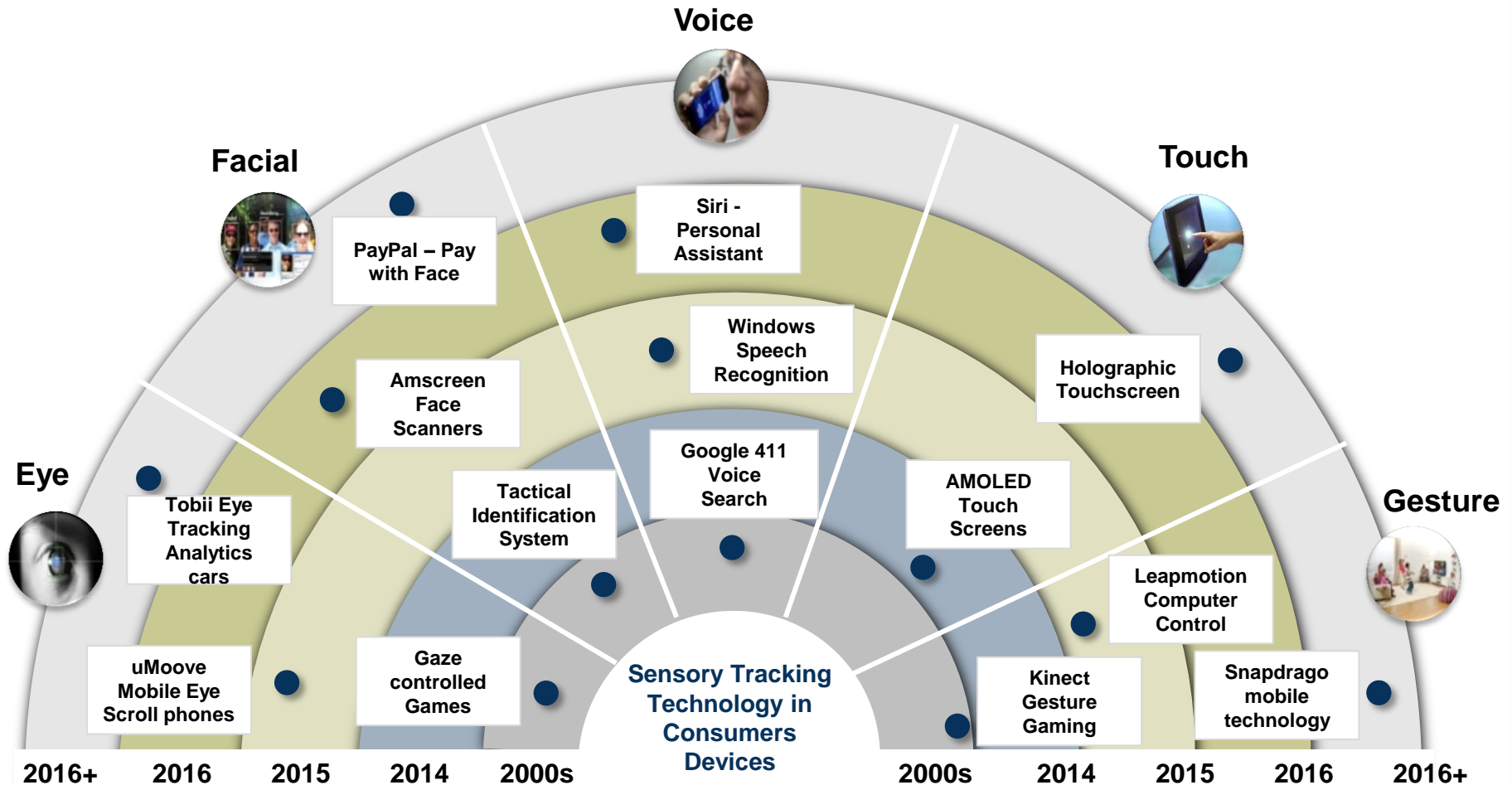
**Remote
Monitoring
(2020)**
\$1.2 Billion

Source: Frost & Sullivan

Transformational Shift #5 – 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

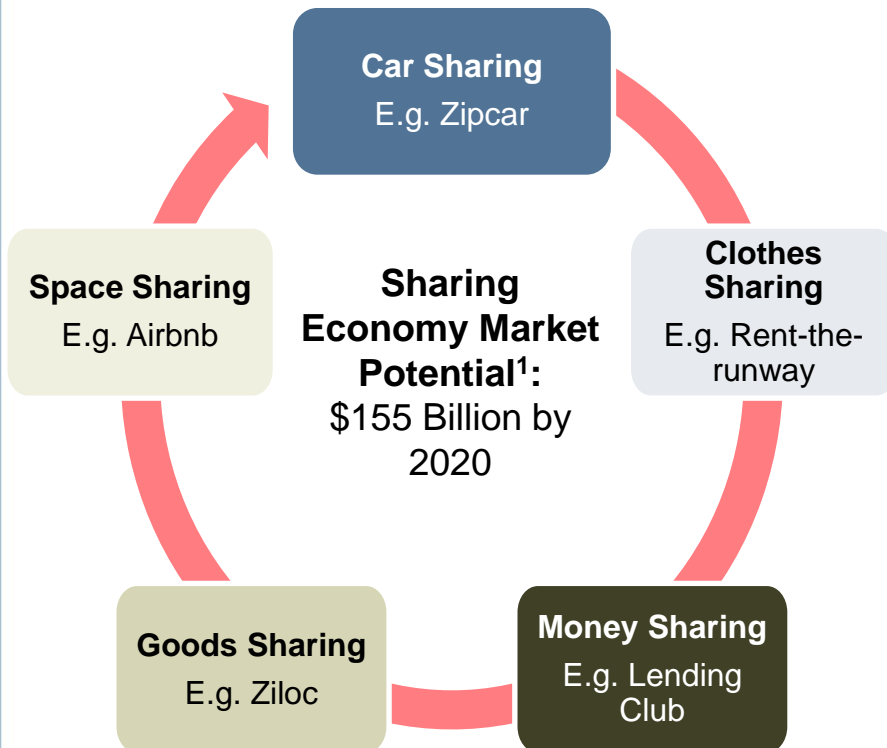


Source: Frost & Sullivan Analysis

Transformational Shift #6 – Sharing Economy

Facilitators and intermediaries take the new form of peer-to-peer / people-to-people marketplace as the phenomenon of shared economy rises, underlined by online convenience and benefits in savings

Key Commodities Shared and Market Potential



Forms of Sharing and Implications

Renting

Swapping

Reusing

Distributing

Lending

Circular Economy

Crowdsourcing

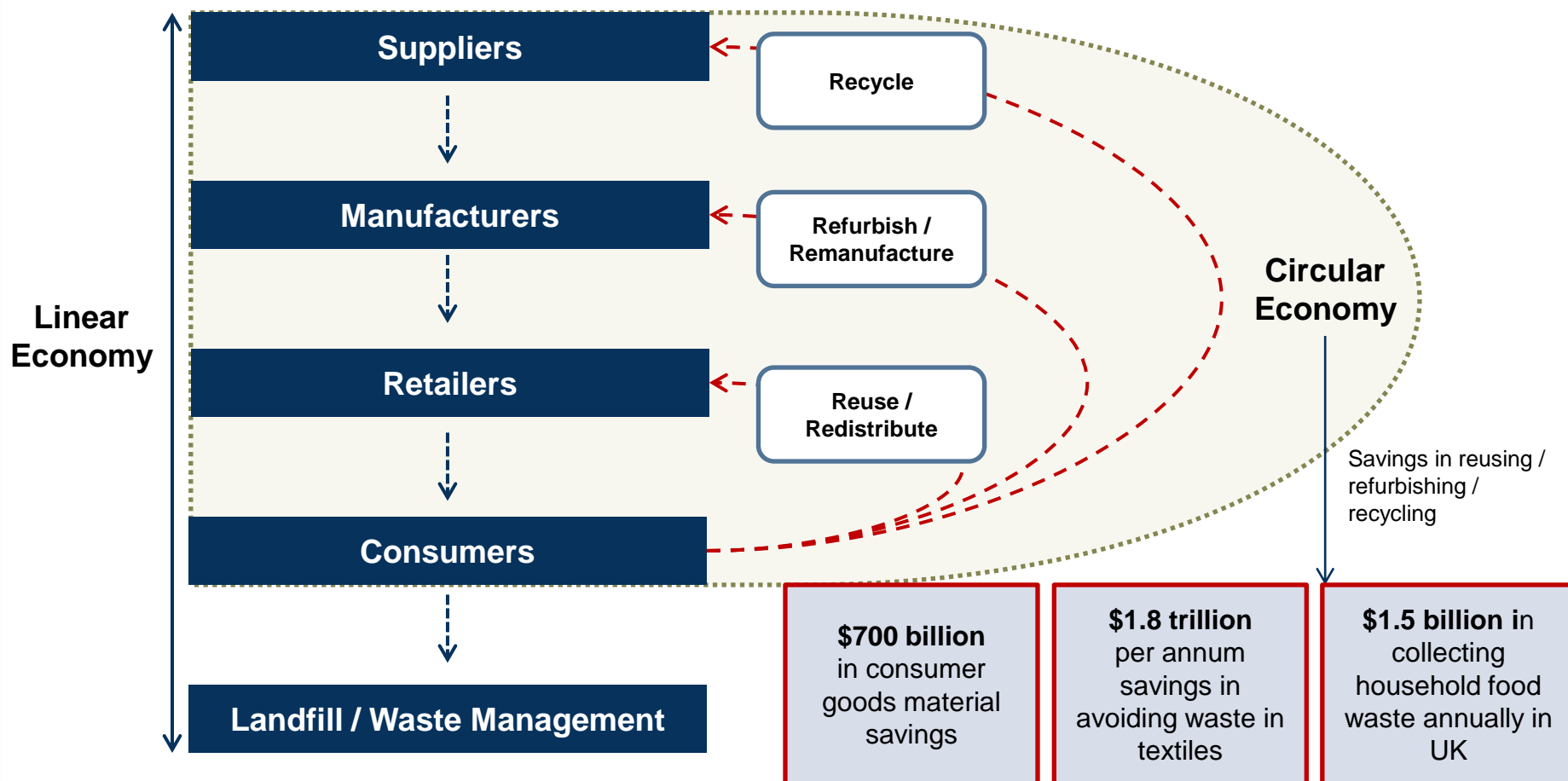
e-Marketplaces

¹Calculations based on Airbnb study on money value of shared economy

Transformational Shift #7 – Circular Economy

Circular Economy to promote efficient use of resources, cleaner production and support resource optimization and an opportunity in excess of \$1 trillion for the global economy.

Circular economy refers to an industrial economy, which on contrary to the traditional linear economy, reclaims the used materials and recycles it as secondary raw materials for new products.

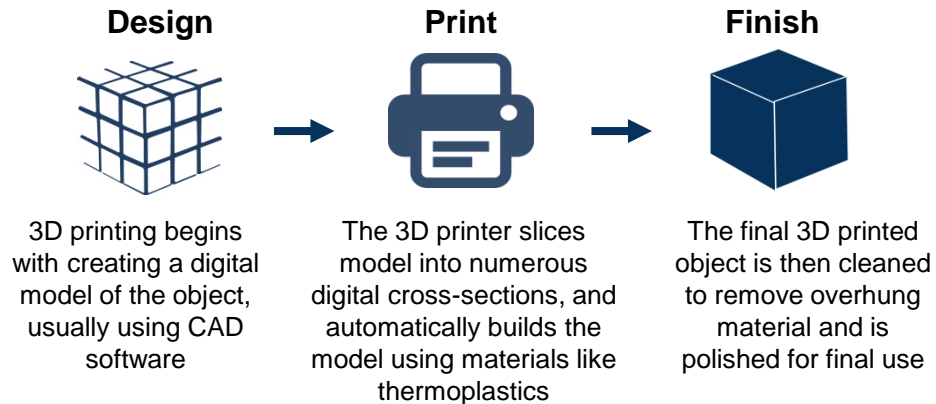


Source: ESA, Ellen MacArthur Foundation, Frost and Sullivan

Transformational Shift #8 –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.



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



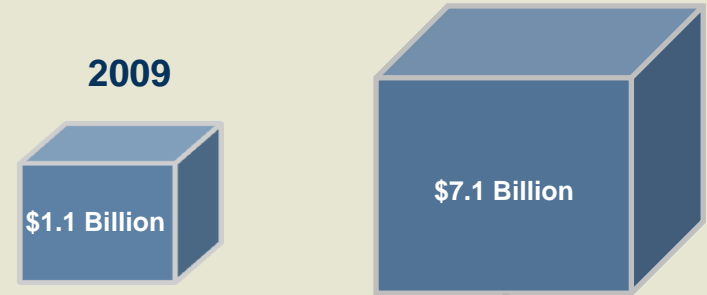
- Manufacturing On-demand
- Cutting Tools
- Customization
- Domestic Production

Manufacturing



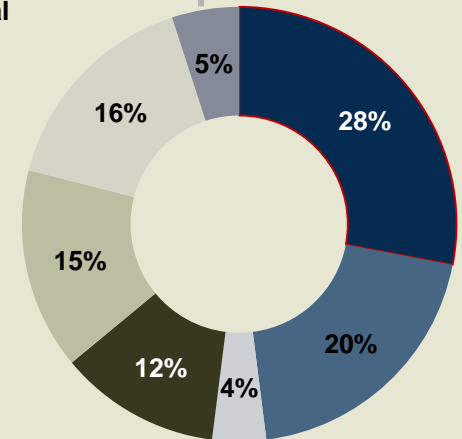
Global 3D Printing Market, Segment Breakdown, 2009 and 2020

Total Market (\$Billion)



By Industry (% Share)

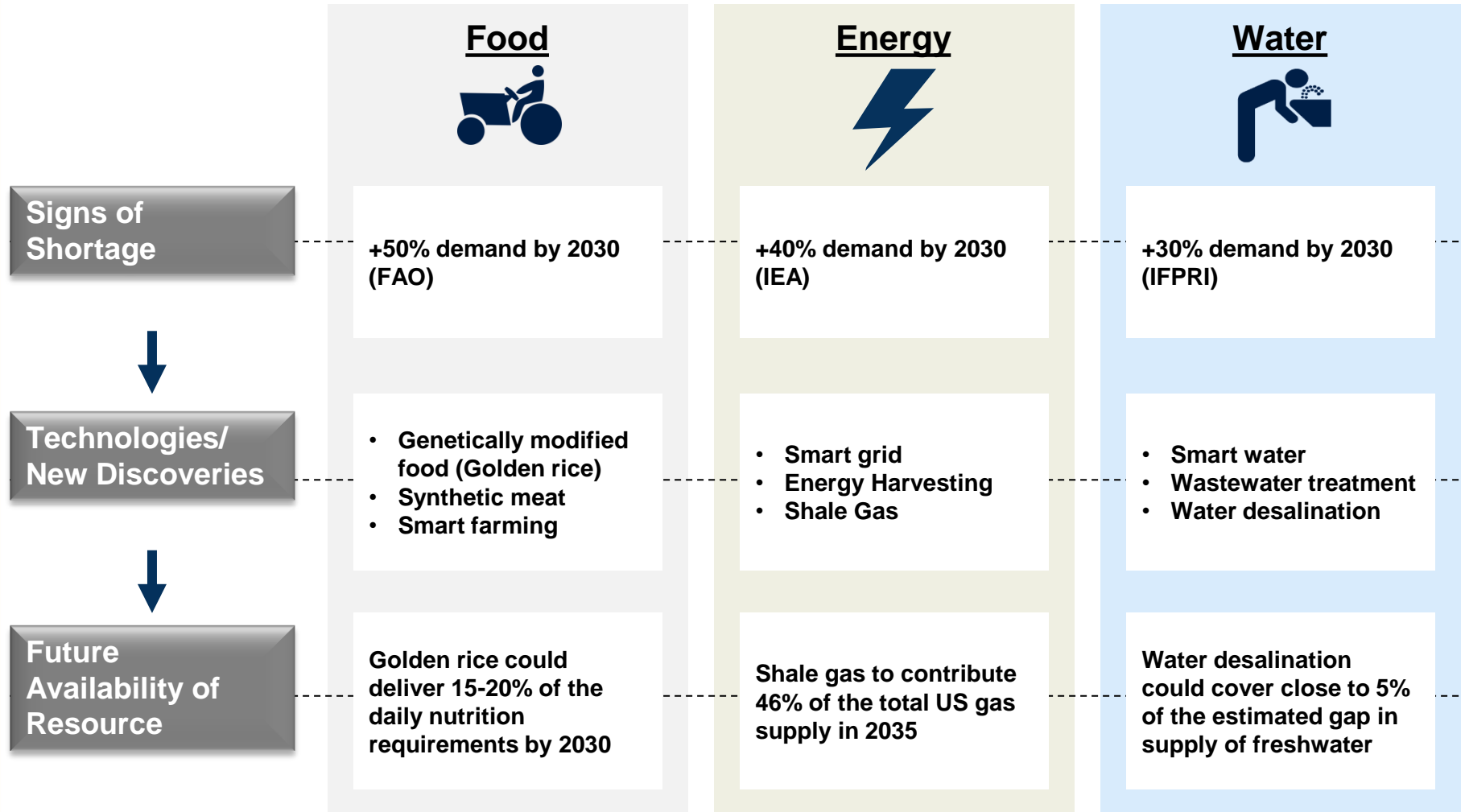
- Consumer & Commercial
- Automotive
- Architecture
- Industrial Application
- Aerospace & Defense
- Medical and Dental
- Other



Source: Frost & Sullivan Analysis

Transformational Shift #9 – Resource Nexus

Discovery of new technologies and energy sources has altered the global energy landscape making key resources such as water, food, and minerals more easily accessible



Source: FAO, IEA, IFPRI, WHO, and Frost & Sullivan Analysis

Transformational Shift #10 – 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 for household care



Robots for companionship



Robots as Teaching Assistants



Robots as Nannies



Robots as personal assistants




Source: Frost & Sullivan Analysis

Connectivity & Convergence

Connected Living—Breakdown by Segments

Connected City leads with an estimated market potential of \$392 Billion by 2020; Smart Governance and Education services will contribute 50% of growth in this segment

Connected Living Market: Market Size Breakdown by Segments, Global, 2020

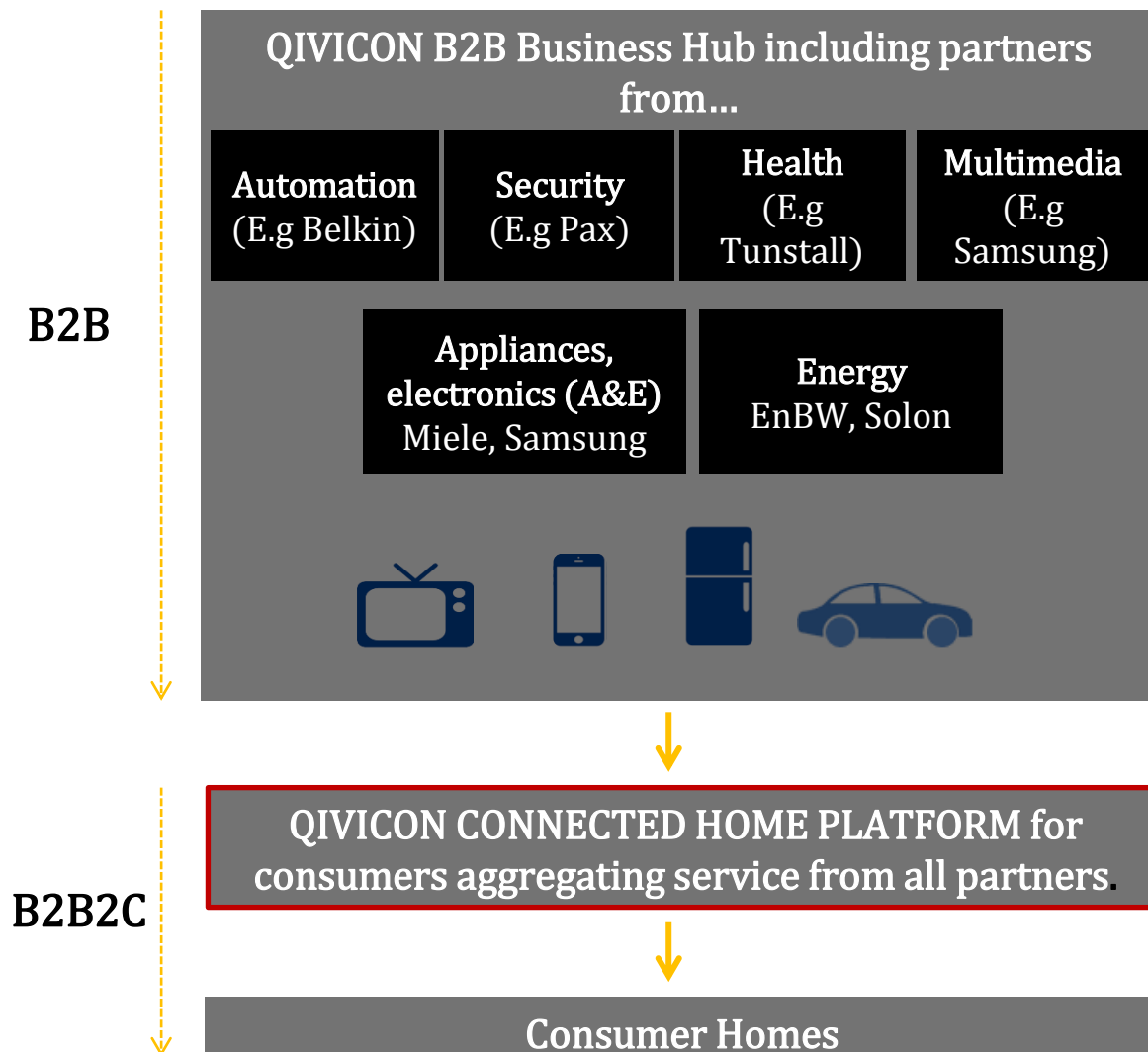
Market Segments (\$ Billion)		2012	2020
 Home	Health	3.48	20.11
	Media and entertainment	21.1	76.9
	Energy	2.35	8.61
	Automation and control	2.76	5.41
	Connected Home Total	29.65	111.0
 Work	Communication*	26.2	73.10
	Enterprise Mobility	48.01	145.02
	Enterprise Social Software	0.72	10.44
	Connected Work Total	74.92	228.44
 City	Governance	32.2	99.7
	Banking and Financial	26.90	94.50
	Transportation	28	80
	Education	36	118
	Connected City Total	122	392.24
Connected Living Total		226.83	731.70

*Unified Communication Products and Solutions

Source: Frost & Sullivan Analysis.

Case Study: Connected Home's B2B Platform Of Deutsche Telekom

A platform-based approach that brings together leading companies



- 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

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

The use of game mechanics and design in non game context to impact engagement and outcome

Uses

- Mobile and tablet applications
- Software programs
- Educational tools

Predicted areas of impact

- Employee performance
- Education
- Personal development
- Customer engagement platforms

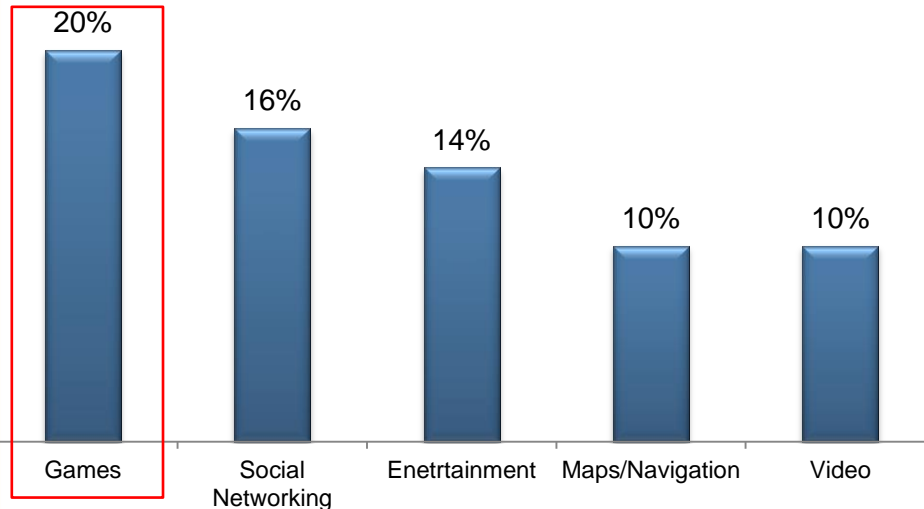
Current enablers

- Mobile
- Cloud
- Social networking
- Location based services

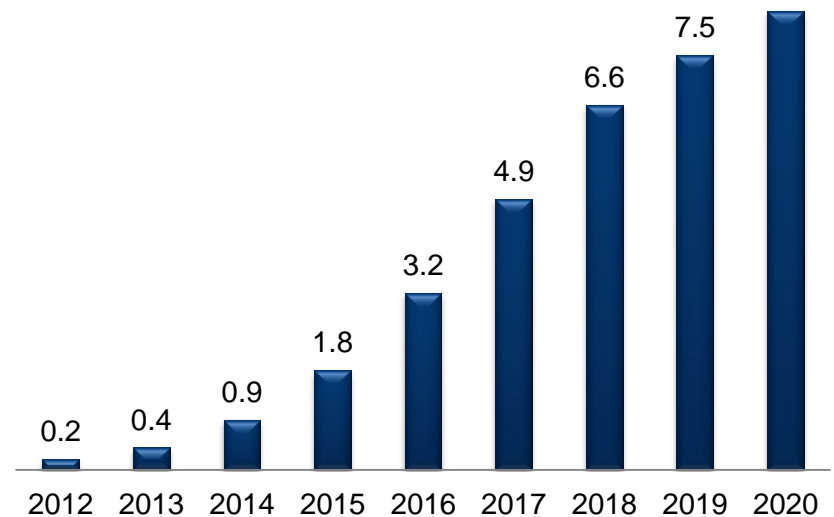
Future enablers

- Gesture control
- Augmented reality

Consumer App Usage Patterns, Global, 2012



Gamification Market, Global, 2012-2020, (\$ billion)



Source: Deloitte, Google Trends, Frost & Sullivan Analysis.

Implication: Connectivity Is Pushing Convergence

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

1

INDUSTRIES

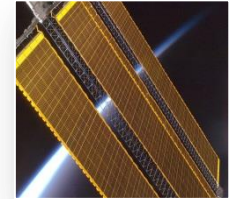
Space Industry



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

Convergence is Driving Unconventional Players to Contest for New Markets!

- Google - Nest , Titan Aerospace



- Amazon - Dash, Fire TV



- Facebook – Oculus, Connectivity Labs



Technologies Driving Innovation

Innovation driven future world!

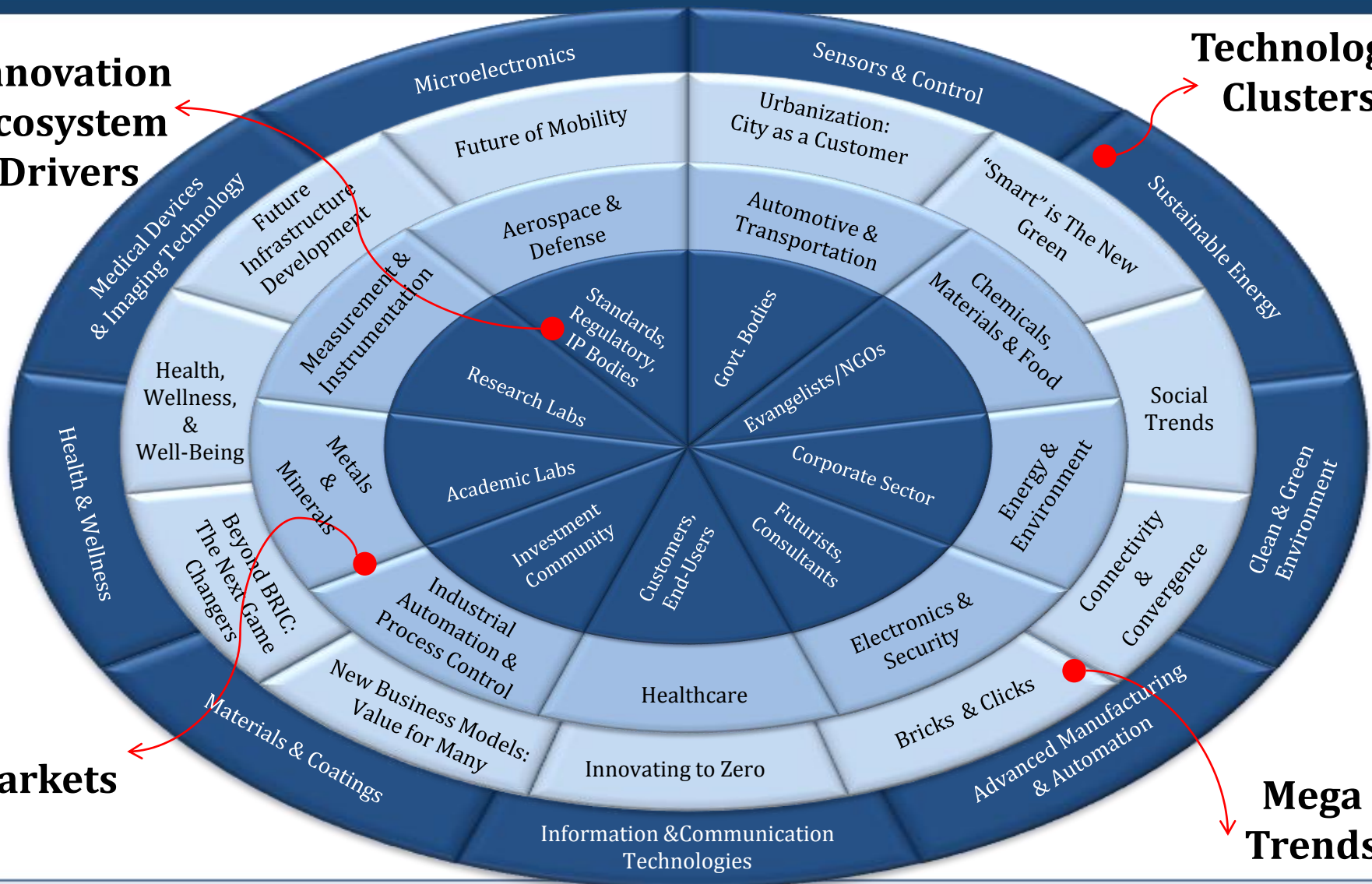
We look at “technology cluster ↔ market ↔ trend” interplay to evaluate and pick top 50 technologies (for a given year) from a larger pool of 500+ technology capabilities

Innovation Ecosystem Drivers

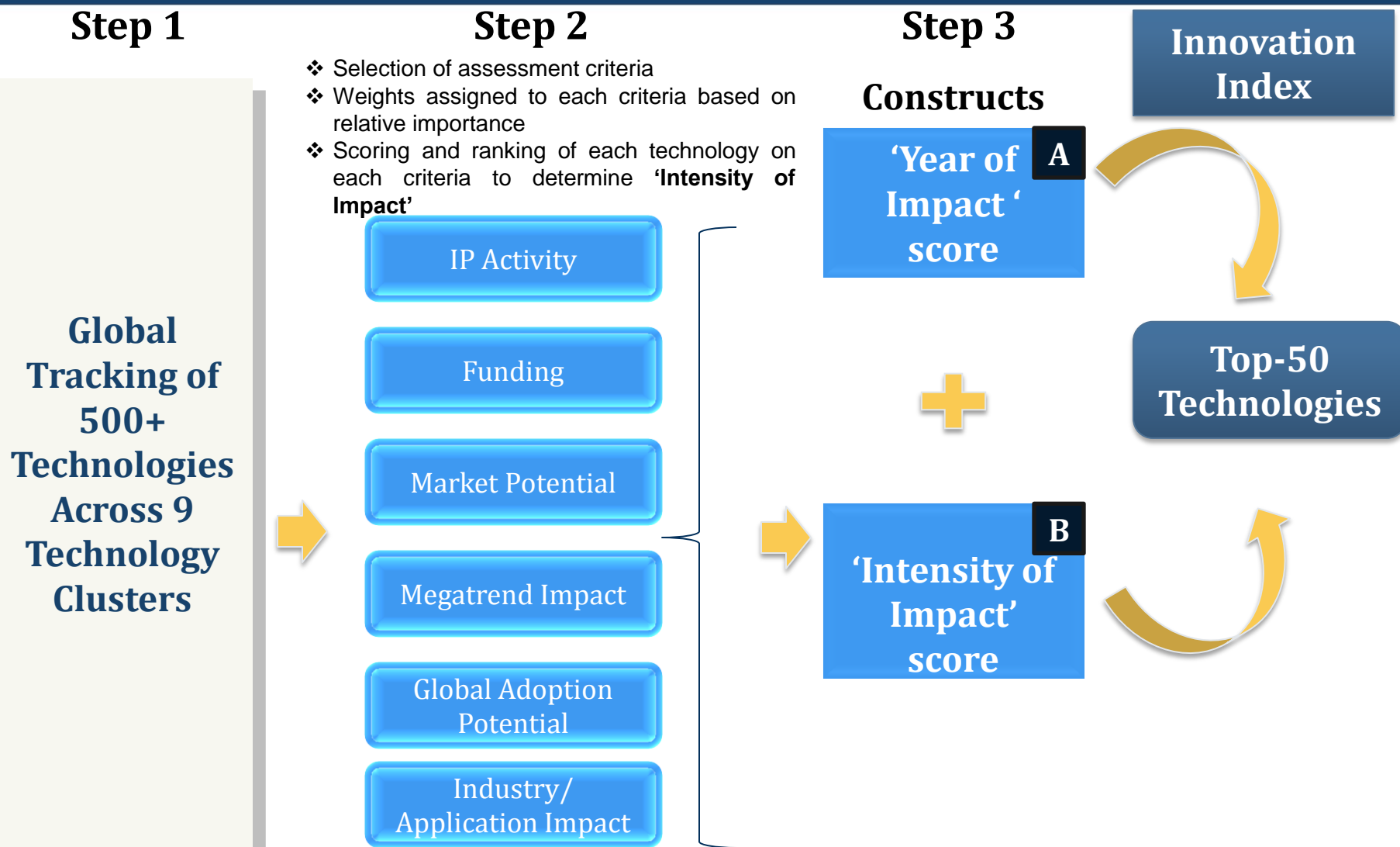
Technology Clusters

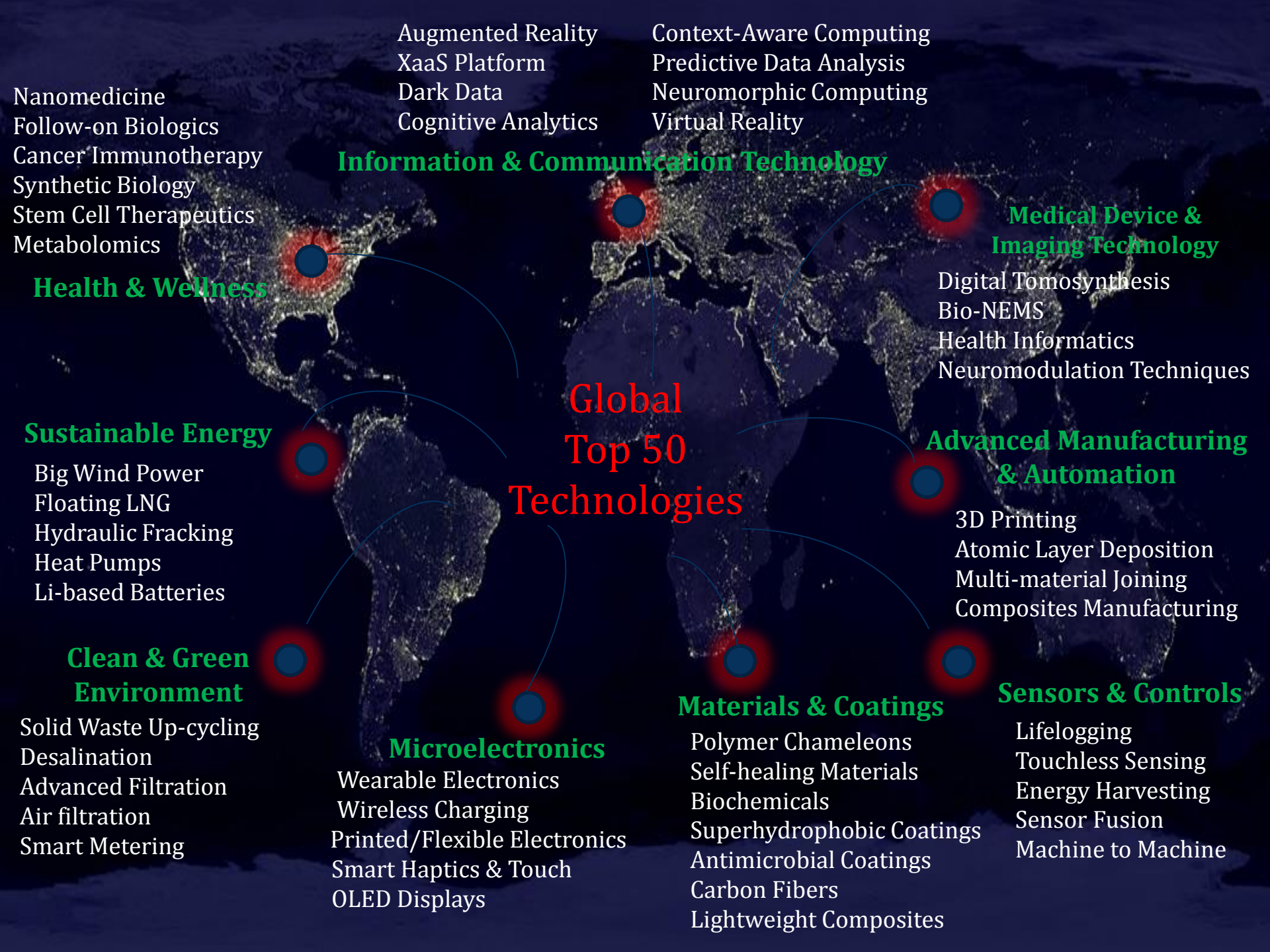
Markets

Mega Trends



Top 50 Technologies - Selection Methodology





Interesting signals associated with Top 50 Technologies

Identifying and evaluating macro/micro signals (past, present, forecasted) associated with the technologies is key to understanding true potential and future impact on markets and industries

Market Potential



\$2.8 T over 5 years



**\$120+ B in
2013**

Funding

Patent Activity



**175K patents awarded
over last 3 years**



**Average impact
across
5 industries and
3 Mega Trends**

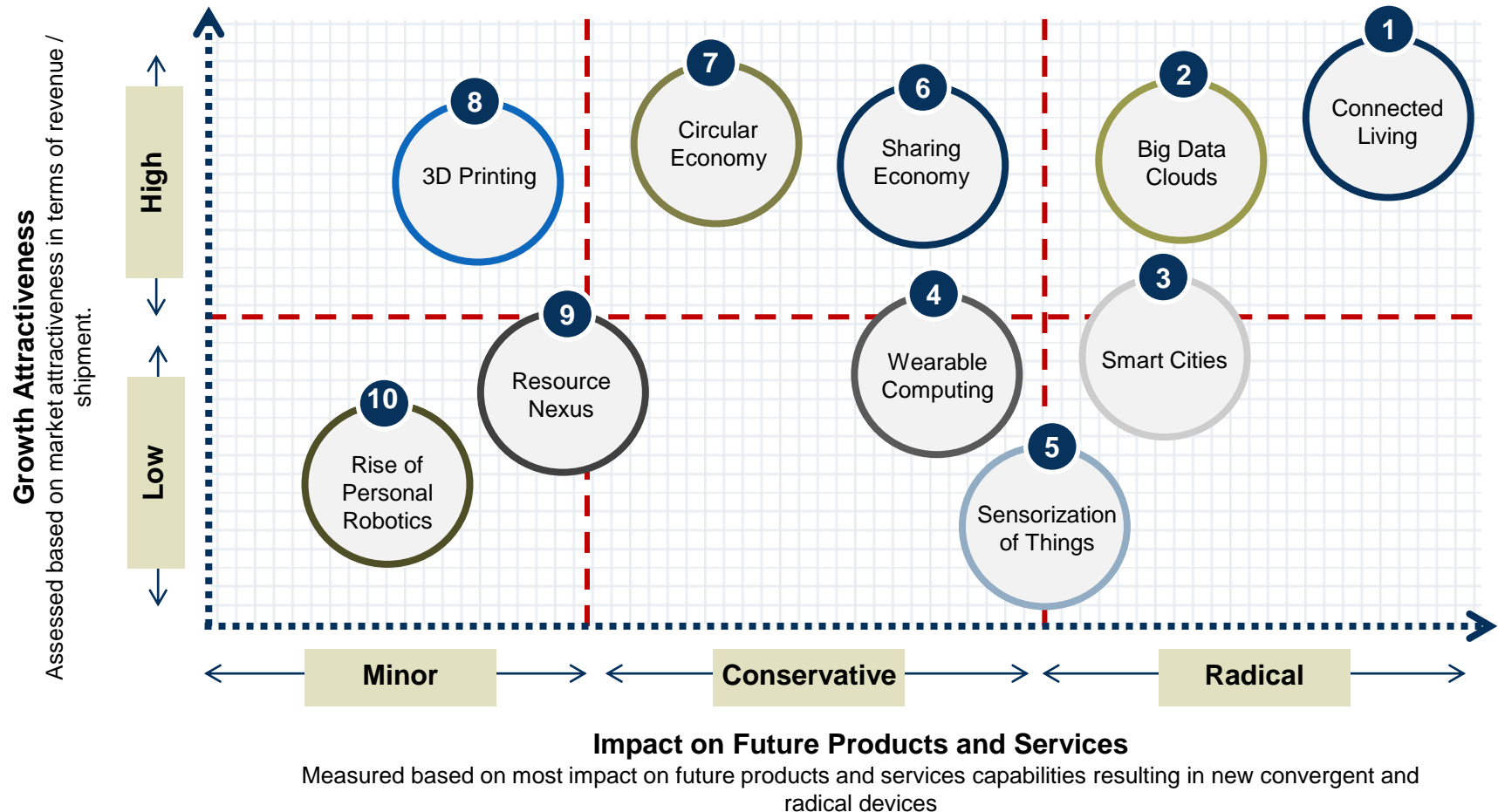
Convergence

Conclusion:

Impact of The Transformational Shifts & The Emerging Industries

Top Ten Transformational Shifts by 2020

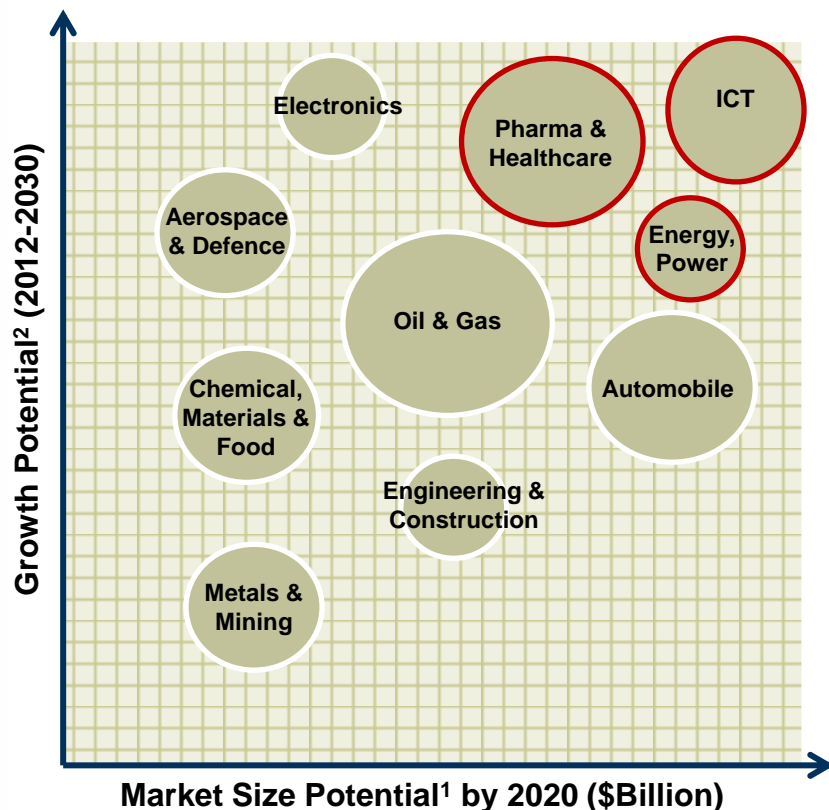
While all Mega Trends are important, the selection and ranking of these trends indicate which seismic shifts will have particular relevance in shaping the landscape in which the world will evolve this decade.



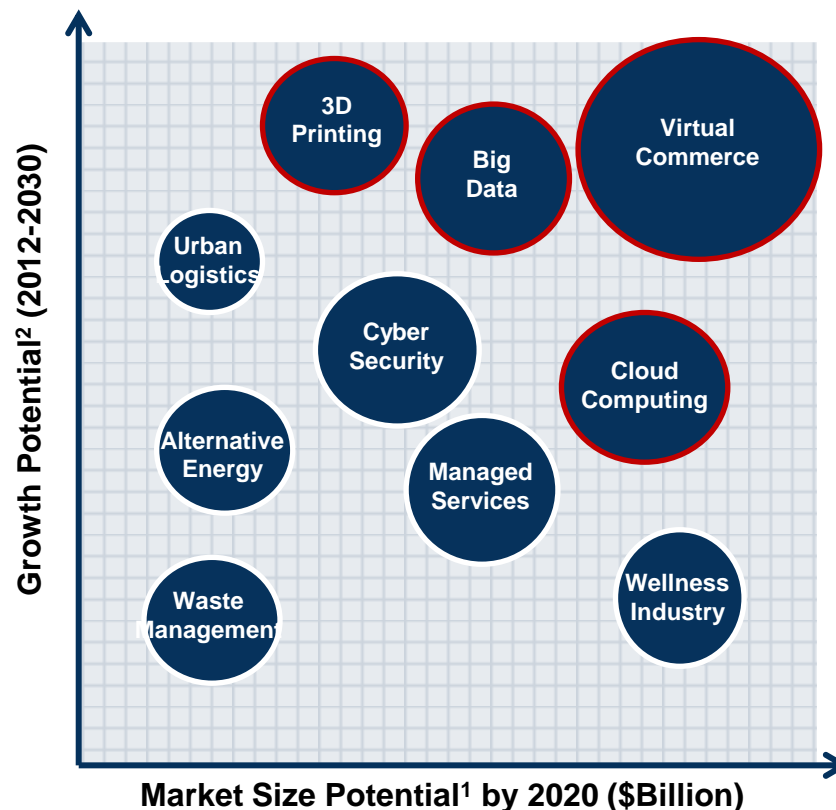
Source: Frost & Sullivan analysis.

10 Key Industries of the Future

Top Mature Industries by 2020



Top Emerging Industries by 2020



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

²Measured 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

Innovative Convergence' Drives Solutions!




Thank You !

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

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“We Accelerate Growth”