Mega Trends and the Nondestructive Testing Industry

Macro to Micro Opportunities on Future Business, Cultures and Personal Lives

By
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Agenda

• Introduction and Definition of Mega Trends
• Presentation of Top Mega Trends
• Conclusion and Macro to Micro : How To Apply Mega Trends Within Your Organization to Develop Growth Strategies
Top Mega Trends

What is a Mega Trend?

Mega trends are **transformative, global** forces that define the future world with their far reaching impact on **business, societies, economies, cultures and personal lives.**
Mega Trend 1:
Urbanisation - “City as a Customer”
Mega Cities in 2025

By 2025, 35 Mega Cities will exist globally, and about 77% of these will be from the developing world. Tokyo will be the largest Mega City in 2025, with a population of 38.7 million.

Note: A Mega City has a population greater than 8.0 million and a GDP of $250.00 billion or more.

Source: United Nations, Department of Economic and Social Affairs, Population Division (2012); World Urbanization Prospects: The 2011 Revision; and Frost & Sullivan analysis.
Top Mega Regions of the World in 2025

By 2025, 21 Mega Regions will exist globally. Shanghai and Guangdong Mega Regions will contain 9% of the total population of China.

Source: United Nations, Department of Economic and Social Affairs, Population Division (2012); World Urbanization Prospects: The 2011 Revision; and Frost & Sullivan analysis.
By 2025, there will be 21 Mega Corridors globally.

- **Latin America (2)**
  - Rio de Janeiro-Sao Paulo-Campinas Corridor
  - Toluca-Mexico City-Puebla Corridor

- **Europe (2)**
  - Trans-European Network Transport (TEN-T)
  - Blue-Banana Corridor

- **Africa (3)**
  - Abidjan-Ouagadougou Corridor
  - North-South Corridor
  - Kampala-Nairobi-Mombasa Urban Corridor

- **India (8)**
  - Delhi Mumbai Industrial Corridor
  - Mehsana-Valsa
  - Mumbai-Ahmedabad
  - Mumbai-Nagpur
  - Bangalore-Belgaum
  - Hyderabad-Hindupur
  - Srikakulum-Nellore
  - Chennai-Hosur

- **Cross-country (1)**
  - Beijing-Tokyo-Pyongyang-Seoul Corridor

- **Japan (1)**
  - Tokyo-Osaka Corridor

- **Jakarta (2)**
  - Sumatra-Java
  - Jakarta-East Java

- **Malaysia (5)**
  - Sarawak Corridor of Renewable Energy (SCORE)
  - Sabah Development Corridor (SDC)
  - East Coast Economic Region (ECER) Corridor
  - Northern Corridor Economic Region (NCER)
  - Iskandar Development Region (IDR) Corridor

- **United States (3)**
  - Southern California
  - Great Lakes Corridor
  - Bos-Wash (D.C.) Corridor

- **Turkey (1)**
  - Istanbul-Izmir Mega Corridor

- **China (7)**
  - Beijing-Harbin and Dalian
  - Beijing-Shanghai
  - Shanghai-Chengdu
  - Ningbo-Shenzhen
  - Beijing-Guangzhou
  - Shanghai-Kunming
  - Guangzhou-Shenzhen-Hong Kong

- **Australia (2)**
  - Brisbane Urban Corridor
  - Perth Urban Corridor

**Note:** Mega Corridors are corridors that connect two major cities or Mega Regions (60 km or more apart, and with a combined population of 25 million or more). The corridors can be planned transportation or economic corridors (with planned investment going into transport infrastructure, industrial zones, energy, or real estate) or naturally evolving urban corridors.

**Source:** UN-Habitat and Frost & Sullivan analysis.
Mega Slums

Globally, 22% of the total population will live in slums by 2025.

Slum Population, Global, 2025

1. Asia: 56.9% (475.7 million)
2. Rest of the World: 43.1% (362.0 million)

Forecasts:
- Sub-Saharan Africa: 196.8 million
- Latin America and the Caribbean: 25.1 million
- Southern Asia: 41.8 million
- Southeastern Asia: 89.4 million
- Western Asia: 88.7 million
- Eastern Asia: 362.0 million
- Oceania: 1.1 million
- Europe: 476.0 million

Note: The numbers in the circle are in millions.

Source: UN-Habitat and Frost & Sullivan analysis.
Cities, and Not Countries, Will Drive **Wealth Creation** In the Future

Cities like Seoul account for 50% of the country’s GDP; Budapest (Hungary) and Brussels (Belgium) each for roughly 45%.

What are the **Micro Implications**?

High Economic Power
Hub and Spoke Business Model
Transit oriented development
New Mobility Solutions
City as a Customer
Mega Trend 2: 
Smart is the New Green
Smart Cities  Smart Technology  Smart Infrastructure
Smart Energy
Smart Mobility  Smart Buildings  Smart Windows
Smart Clouds
Smart Materials  Smart Bandages  Smart Factory
Smart Meters

FROST & SULLIVAN
Smart Factory Case Study: Toyota Practices “Kakushin” in its New Takaoka Plant

Able to Build 8 High-Volume Models as Against 3 on the Original Assembly Line

- Cost-cutting to generate more than $2.5 billion
- Lead time to add new model halved
- Sensors that monitor quality during each process

Current Plant

- 2006 – 660,000 Capacity

Future Plant

- 2010– Capacity 500,000

A welding system that slashes the cost of jigs and other tooling.

A paint process that eliminates the need to let the base coat dry.

Stamping presses that use servo-motors rather than hydraulics, combined with high-speed delivery robots.

Ditch huge expensive machinery

A "set parts system" that delivers a basket of parts to each vehicle.
Mega Trend 3:
Social Trends
Geo Socialization

Gen Y

Middle Bulge

Reverse Brain Drain

Ageing Population

"She-conomy"

Surge in Asian Work Pool

Generational Political Shift
Geo Socialization

Gen Y

Middle Bulge

Surge in Asian Work Pool

Generational Political Shift

“She-conomy”

Ageing Population

Reverse Brain Drain

Frost & Sullivan
Global Population in 2025: Out of 2.4 Billion Gen Y Population, Around 52% from Asia Alone

Around 37% of Gen Y Population Will Live in India and China Alone

Source: Department of Economic and Social Affairs of the United Nations 2011; Frost & Sullivan, 2012
Mega Trend 4:
Connectivity & Convergence
80 Billion Connected Devices By 2020

10 Connected Devices for Every Household by 2020

5 connected devices for every user by 2020

5 billion internet users by 2020

500 devices with unique digital IDs (Internet of things) per square kilometre by 2020

Source: Frost & Sullivan, 2012
Connectivity will Lead to Convergence of Products, Technologies and Industries

- **UAV**: Unmanned Aerial Vehicle
- **V2V**: Vehicle to Vehicle
- **V2H**: Vehicle to Home
- **V2I**: Vehicle to Infrastructure

**Connectivity in Convergence**

- Environment
- Building Technologies
- Energy
- Automotive
- Aerospace, Defense & Security
- Chemicals
- ICT
- Health Care
Convergence in the NDT Industry

Industry Convergence
- Metrology
- NDT

Product Convergence
- Tablet Computers
- Phased Array Ultrasonic Instruments

Competition Convergence
- “Expert” Alliance
- NDT Training and Equipment Vendors
Mega Trend 5: Bricks and Clicks
Macro To Micro Implications of Bricks and Clicks

Before Clicks
- Big-box Format (Hypermarket)
- Single-Channel
- Money Wallets
- TV Campaigns

After Clicks
- Small-box Format (Virtual Stores)
- Omnichannel
- Mobile Wallets
- Social Media Campaigns

Macro to Micro Implications
- Store Sizes to Decrease by 15%-20% by 2020 (from 2011 levels)
- In-store, online and mobile to integrate creating a ‘Omnichannel’ shopping experience
- M-Payment Users to increase by 16% exceeding the 1 billion mark by 2025
- New Marketing Solutions through new ‘social’ platforms
Mega Trend 7:
New Business Models:
Value for Many
New Business Models

- Personalization & Customization
  - Nike

- Co-Creation
  - Quirky .com

- Service as a Business Model
  - Location Based Services

- One-off Experience
  - (red letter Days)

Source: Frost & Sullivan, 2012
Free + Premium = Freemium

“Value for Many”

Will Replace

Sharing - What is Yours is Mine

“Value for Money”

Affordable Healthcare

Group Buying

Low Cost Products

Micro Finance

Source: Frost & Sullivan, 2012
Mega Trend 8:
Economic Trends
The Next Game Changers in 2025

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

The Next Game Changers in 2025—Increasing Oil and Gas Activity in Africa Driving Economic Growth

- **Emerging oil and gas Producers**
  - Ethiopia and Somalia: Exploration activity has found reserves of oil and gas, however, production is still a few years apart.
  - Kenya: Recent oil and natural gas discoveries have increased investment. 46 oil blocks auctioned off in the past year.
  - Tanzania: Large natural gas reserves discovered recently. The country looking to develop the reserves and start exporting power by 2015.
  - Mozambique: Large recent natural gas discoveries add to the existing reserves. Production to ramp up with potential export of natural gas to South Africa being planned.

- **Current Major Oil and Gas Producers**
  - Gabon: The country has been producing oil for decades but production has been dwindling over the past 15 years due to depletion of reserves. However, offshore oil discovery is expected to usher in the next oil boom in the country.
  - Ghana: The country planning $20 billion investment in the oil and gas sector over the next 5 years. Oil production expected to double by 2021.
  - Cameroon: Oil production has been declining steadily since 1985 but large natural gas reserves remain largely untapped. The country expected to invest in developing the natural gas reserves over the next 5-7 years.
  - Equatorial Guinea: Oil production rebounded in 2012 after declining year on year since reaching a peak in 2005. Natural gas production rising and expected to witness considerable investment.
  - Gabon: Oil discovered recently in partnership with a Brazilian firm after years of exploration. Production expected to start in the next 5 years.

- **Potential oil and gas Producers**
  - Ivory Coast: Recent oil discoveries are expected to enhance oil production by 200,000 bpd in 5 years from approximately 32,500 bpd being produced currently.
  - Ghana: Recent oil and natural gas discoveries have increased investment. 46 oil blocks auctioned off in the past year.
  - Tanzania: Large natural gas reserves discovered recently. The country looking to develop the reserves and start exporting power by 2015.
  - Mozambique: Large recent natural gas discoveries add to the existing reserves. Production to ramp up with potential export of natural gas to South Africa being planned.
  - Nigeria: The country planning $20 billion investment in the oil and gas sector over the next 5 years. Oil production expected to double by 2021.

Source: Frost & Sullivan Analysis
Key Takeaway: The market is expected to witness high revenue growth rates with significant investment being made in developing new infrastructure.
Mega Trend 9:
Future Infrastructure Development
Investments in Infrastructure Development is expected to cross $27 trillion by 2025

Worldwide Infrastructure Investment, US$ Trillion, 2010-2025 (Cumulative)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Total (US$ trillion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>9.7</td>
</tr>
<tr>
<td>Railway</td>
<td>1.5</td>
</tr>
<tr>
<td>Air/Seaport</td>
<td>1.0</td>
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<tr>
<td>Power</td>
<td>9.7</td>
</tr>
<tr>
<td>Water</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Source: Frost & Sullivan analysis.
CAPEX in Developing Canadian Upstream Infrastructure Increasing Steadily

E&P Capital Expenditure in Oil and Gas, Canada, 2005-2013

CAPEX in Developing Pipeline Infrastructure Increasing at a High Pace

Planned CAPEX ($B)

- 2011: 1.3
- 2012: 2.6
- 2013: 5.7

Source: Oil and Gas Journal, Frost & Sullivan Analysis
From Macro to Micro: Taking Mega Trends from Information to Strategy Implementation

**Mega Trend**
Selected trends that impact your business and markets

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

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

**Analysis of Opportunities and Unmet Needs**

**Impact on Future Product/Technology**

_Frost & Sullivan_
Thank You

Questions?
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