Frost & Sullivan has defined a smart city as one that has an active plan and projects in at least five of the eight functional areas of Energy, Buildings, Mobility, Technology, Infrastructure, Healthcare, Governance, and Citizens. Each of these key parameters has specific components that define the 'Smartness' of a City.

The Smart City Market is estimated at a huge US$1.56 TRILLION by 2025. We have identified leading Smart Cities at a global level.

Most projects are funded through multiple sources and switch mechanisms depending on risk appetite, investment size, and duration of financing. Government Financing, Institutional Funding, and Revenue Based solutions all form part of this mix.

There are different types of Smart City operating models: Build Own Operate; Build Operate Transfer; Open Business Model; and Build Operate Manage.

Frost and Sullivan helps Cities and Suppliers find opportunities and ROI with data driven insight and analysis, supported with workshops and consultancy.

Source: Frost & Sullivan
Frost & Sullivan smart city service

Cities are complex and evolving economies that must be focused on

Numerous factors are putting a strain on cities..

- Meeting budget demands
- Changing leadership
- Population and infrastructure

...And impacting the key issues cities care most about

- Providing high quality of life
- Increasing the tax base
- Ensuring low environmental impact
- Retaining fiscal responsibility
Frost & Sullivan has defined a smart city as one that has an active presence and plan in at least five of the eight criteria below and has clearly demonstrated projects in place.
**Frost & Sullivan smart city service**

### Key parameters that will define a smart city in 2020 examples of segmentation of components that drive smartness

<table>
<thead>
<tr>
<th>Category</th>
<th>Components</th>
</tr>
</thead>
</table>
| **SMART ENERGY: DIGITAL MANAGEMENT OF ENERGY** | • Smart Grids  
• Smart Meters  
• Intelligent Energy Storage                                              |
| **SMART BUILDINGS: AUTOMATED INTELLIGENT BUILDINGS** | • Renewable Energy Integration  
• Building integrated Photovoltaic                                           |
| **SMART MOBILITY: INTELLIGENT MOBILITY**      | • Low-emission Mobility  
• Integrated Mobility Solutions  
• Multimodal Transport                                                       |
| **SMART TECHNOLOGY: SEAMLESS CONNECTIVITY**   | • Broadband penetration rate of over 80%  
• 50% of households to have smart home  
• Smart Personal Devices                                                      |
| **SMART INFRASTRUCTURE: DIGITAL MANAGEMENT OF INFRASTRUCTURE** | • Sensor Networks  
• Digital Water and Waste Management                                           |
| **SMART GOVERNANCE: GOVERNMENT-ON-THE-GO**    | • Use of e health and health systems  
• Intelligent and connected medical devices                                    |
| **SMART HEALTHCARE: INTELLIGENT HEALTHCARE TECHNOLOGY** | • e-Government  
• e-Education  
• Disaster Management Solutions                                                |
| **SMART CITIZEN: CIVIC DIGITAL NATIVES**      | • Use of Green Mobility Options  
• Smart Lifestyle Choices  
• Energy conscious                                                             |
Frost & Sullivan smart city service

Smart city market: smart cities to create huge business opportunities with a market value of $1.56 Trillion by 2025

SMART ENERGY
Highest growth rate (CAGR): 28.7% by 2025
Highest growth in Smart Meter (CAGR): 23.15% by 2025
Highest growth in North America

SMART HEALTHCARE
North America to dominate the smart healthcare market with more than 50% share by 2025, followed by Europe

SMART TECHNOLOGY
CAGR: 18.23% by 2025
More projects coming up in North American and European regions

SMART INFRASTRUCTURE
Highest growth in smart utilities market (CAGR): 10.16% by 2025
Highest growth in North America and Asia

SMART BUILDING
The market to reach $1 trillion mark by 2030
China and India are the fastest growing market followed by Japan and Korea

Numerous factors are putting a strain on cities..
By 2018, Europe is expected to witness five-fold growth in installed base of smart meters. Europe will experience a growth rate of 20%–25% in the smart grid market in the next 3 years.

Smart technology is set to fuel double-digit growth in the European HEMS and BEMS markets by 2018. Smart Building Technology segment is expected to have the highest growth rate with spending reaching around $17.4 billion.

European Commission to invest $224 million (€200 million) in Smart Cities in the next two years. According to ERDF regulation around $16 billion funds is to be invested annually towards development of smart city through 2014–2020.

New wireless network and automation technologies like Z-Wave, Insteon, and many more are expected to be the emerging technological trends in the smart cities market.
Investment and funding of smart cities in Europe

Popular funding mechanisms adopted for smart city projects across Europe, 2014-2020

- **Private Investment**: Financed through commercial stakeholders, service providers, private investors, and venture capitalists (for example: Amsterdam Smart City Platform)

- **PPPs**: Funded and operated through a partnership of government and one or more private sector companies (for example: Cisco and Copenhagen Partnership)

- **Special development funds**: Specific funds set up to implement and scale-up urban development or smart city initiatives (for example: European Commission’s ‘JESSICA’ Urban Development Funds and Horizon 2020)
Frost & Sullivan helps cities and suppliers find ROI and opportunities

**WHAT’S NEEDED**

- Greater **COLLABORATION** across cities and with cities and suppliers
- More **BENCHMARKING DATA** specific to what cities are doing well and where they have gaps
- Rigorous **MARKET QUANTIFICATION** for where cities can find the best ROI, and suppliers the strongest opportunities
- Identification of **BEST PRACTICES** in different countries and regions on Smart Cities
- Strategy planning for **LONG-TERM TRENDS** for both cities and their suppliers

**HOW WE HELP**

Frost & Sullivan provides **DATA DRIVEN** content and insights to form the basis of our analysis and recommendations, combined **WITH INDUSTRY LEADING INTERACTIVE WORKSHOPS** to make sense of these opportunities for cities and suppliers, leveraging our **CONTACT BASE ACROSS BOTH CITIES AND SMART CITY SOLUTION PROVIDERS**
Frost & Sullivan smart city service

Typical working relationship

1. Smart cities research
   Access to Smart City reports, market insights, and articles

2. Smart cities briefings
   Tailored thought-leader speeches and keynote discussions

3. Smart cities workshop
   Interactive session with detailed focus on smart cities uniting company focus on smart cities

4. Smart cities consulting
   Client-specific consulting project (or bespoke white paper) centered on a defined question
Frost & Sullivan smart city service

1. Typical working relationship

Smart cities research

Access to Smart City reports, market insights, and articles

Access to smart city research content that highlights

- Market potential of smart city ecosystem
- Profile of selected smart cities and smart city projects
- Industry implications and opportunities from Smart Cities
- Value chain analysis and study of selected cities
- Heat Map of Europe’s Real-Time Cities — Progress towards Commercialization
- Business Models of Selected Smart City Projects
Frost & Sullivan smart city service

2 Smart city briefings: interactive options

Urban innovations briefings

- Powerful thought leadership to drive city based innovation
- Motivating and inspiring
- Examples topics such as:
  - Innovating to the Future: Future of Smart Cities
  - Future of Mobility in Cities
  - New Smart Cities
  - What are Intelligent Spaces?
  - Top Trends for 2015/2016
  - Future of Urbanization & Logistics
- 30 minutes to 2 hours (typically)
- Can be performed in person, telepresence, phone
- Excellent for corporate meetings, training, Shareholder meetings, company events, sales etc.
3 City growth workshops a systematic process to understand smart cities and uncover growth opportunities

1. Frost & Sullivan published or customized research Key stakeholder insights on goals and strengths

2. Identification of top markets that can be opportunities for the city or provider

3. Prioritized ranking of the opportunities that align with core capabilities per the Opportunity/Fit Matrix

4. Prioritized ranking of the most attractive best fit opportunities based on a side-by-side comparison of implementation factors per the Strategic Options Grid

A basic strategic action plan for the most attractive and best fit opportunities that accounts for and minimizes risk.
Frost & Sullivan smart city service

### Smart Cities consulting experience 10 select example projects showing both solution provider and direct government experience

<table>
<thead>
<tr>
<th>Client</th>
<th>Project Title</th>
<th>Description</th>
<th>Project Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central America Capital City</td>
<td>Smart City Evaluation and Opportunity Identification</td>
<td>Workshops, we led discussion and education of smart cities to all government leaders, drove opportunity identification and analysis development</td>
<td>5 months</td>
</tr>
<tr>
<td>Major US City</td>
<td>Developing a Smart City</td>
<td>Led initial awareness of a smart city for the City and assisted in creating business model and consortium for developing smart city activities</td>
<td>1.5Years+</td>
</tr>
<tr>
<td>Major Turkish City</td>
<td>Smart City Blueprint and Strategy</td>
<td>Created a system wide analysis of all smart city activities that drive success. Included literature review, workshops and benchmarking of city versus 20 other cities.</td>
<td>Two months</td>
</tr>
<tr>
<td>Major US City</td>
<td>Living Lab Creation</td>
<td>Created a living lab smart city business plan for City. Project to include business model innovation, consortium creation and financing to incorporate multiple city partners.</td>
<td>8 months</td>
</tr>
<tr>
<td>Major Brazilian City</td>
<td>Port development</td>
<td>Identified smart city projects to undertake in the Port area of the City. Led to several new initiatives such as security and lighting.</td>
<td>12 months</td>
</tr>
<tr>
<td>Leading Semiconductor Co</td>
<td>Smart Cities Awareness and Opportunities</td>
<td>Consulting retainer to work with Intel to develop knowledge around smart cities. Involved working with teams by sharing thought leadership on key areas of city development</td>
<td>4 years+</td>
</tr>
<tr>
<td>Major Integrator</td>
<td>Smart City Opportunity Analysis</td>
<td>Workshop and consulting to build a smart cities practice for Maxim. Involved identifying areas of focus as well as internal implementation skills required</td>
<td>5 months</td>
</tr>
<tr>
<td>Global Fortune 100 Confidential</td>
<td>Assistance in development of strategy for cities business</td>
<td>2 years 4 months</td>
<td></td>
</tr>
<tr>
<td>Leading US City</td>
<td>eMerge Americas</td>
<td>Developed content for an run each year for last 4 years the eGov summit held in Miami</td>
<td>4 years+</td>
</tr>
<tr>
<td>Mobility Player</td>
<td>Future or Cities</td>
<td>Workshop to define the role of Mobility Player in cities of the future</td>
<td>3 months</td>
</tr>
</tbody>
</table>
Frost & Sullivan smart city service

Case Study 1
Development of Citizen Centric Smart City Model and Vision for Istanbul Client: ISBAK (Istanbul Transportation Telecommunication and Security Technologies Industry)

Projects objectives
• To perform a comprehensive literature review & best practices analysis
• To perform a detailed evaluation of Istanbul current situation
• To develop a comprehensive vision for Istanbul Smart City

The solution approach
• Setting the fact foundation by reviewing both external and internal resources to define the structure and component of a smart city including an analysis of the Top 10 Global Smart Cities.
• Detailed evaluation and analysis of all components of Istanbul’s current situation. The review will involve a complete analysis of all governmental activities.

The results/benefits achieved
• Suggested Strategic direction based on research to date
• Suggested timelines for key activities required
• Critical 'must have' components for Istanbul including “low hanging fruit”
• Recommendation of products and / or solutions to be deployed
• Recommended business partners and ecosystem for success
• Proposed operating model – i.e. City run, Partner run etc.

• Key focus departmental growth assessments
• Any suggested preliminary metrics and measures for success monitoring
• Next steps plan
Case Study 2
Detailed Mapping of Emerging Smart City Opportunities in India Client: UK Foreign Office/British High Commission in India

Projects objectives
• To identify from UK company perspectives how it could best assist UK companies to be more involved and able to grasp these growth opportunities.

The solution approach
• There were two works streams. One focused on the landscape in India, the other focused on UK company aspirations. In the Opportunities in India WorkStream we reviewed all previous reports, all current government programs, and conducted 5 workshops in 5 cities with senior city authorities, municipal commissioners, and interacted with over 200 participants. A detailed analysis was then conducted on all programs as defined against key areas of Transport, Infrastructure, Energy, Water & Waste Water, Public Services, and Built Environment. We provided detailed breakdown of opportunity nature, size, segmentation, relevance to value chain. On UK Company Aspiration Workstream we looked held 3 workshops in the UK with senior representa-tives from companies engaged, or wanting to be engaged, in India, and understood their areas of focus, interest, their views on the opportunities, their understanding of competitive positioning, and what more they would like UK government to do to support them.

The results/benefits achieved
• The findings are currently being reviewed and incorporated into the detailed regional development plan for the Indian market to maximize value of support by UK Government to UK companies in an manner that will maximize impact and return for UK taxpayer.
Case Study 3
Identifying Smart Opportunities in Smart Cities

Projects objectives
• Develop a profile of the researched cities, with an analysis of the challenges faced by the cities, the drivers for adoption of smart solutions, and examples of solutions made.
• Identify most appropriate opportunities with stakeholder analysis, and understanding of the scale and timeliness of such opportunities, both short and long term. Deliver actionable recommendations on how to take advantage of these opportunities for UK companies.

The solution approach
• Conduct Substantive secondary research, including all Frost & Sullivan data and other sources on trends in both the cities and in the application areas.
• Conduct research with persons in post in the 10 countries.
• Deliver a presentation at a UK premier Technology event and a launch event, where the report was launched by the UK Secretary of State for Business, and present at other launch events. See www.ukti.gov.uk/uktihome/item/218400.html for full report.

The results/benefits achieved
• The Strategic value from this project will enable UKTI to better target resources of support to UK companies, and for UK companies to better understand the nature of the opportunities within the region and how to pursue them.
AIM & OBJECTIVE OF PROJECT:
• To identify the key smart city issues impacting the long term success of their business by identifying specific areas to concentrate product development and business development that would provide alignment with the future of cities. The key aim of the project was to generate a short list of focused opportunities for research evaluation and subsequent focus.

PROJECT METHODOLOGY:
• Frost & Sullivan deployed a three stage process to create outcomes for this client.
• **Stage 1:** Using our Smart City research we identified all the key trends impacting the future of smart cities.
• **Stage 2:** Senior management and Frost & Sullivan convened in a growth workshop to analyse findings from Stage 1 and delineate the primary trends and sub trends driving their business over the next ten years. We used a series of analytical tools to perform this analysis to identify key areas of focus.
• **Stage 3:** Once key areas have been identified and agreed on, our team then created a report that gave strategic recommendations on areas of interest and how the organization can reach those goals.
• The project involved using various Frost & Sullivan resources from both primary and secondary sources.

RESULTS
• Our client through our process identified several key areas for growth that have been explored in further research. Each of the opportunities is in the R&D process and going through diligent IP analysis and technology scouting. It is anticipated that 75% of the opportunities will reach the market, one HR plan has already been executed and new staff is on board.
Case Study 5

How do we Better Understand the opportunity that exists in Smart Cities?

AIM & OBJECTIVE OF PROJECT:
• To provide a series of specific projects that this highly complex city could work on to integrate into its planning and budgeting process. Also to expand the thinking of key government members to ensure the government is on the same page for the future of the city.

PROJECT METHODOLOGY:
• Frost & Sullivan deployed a three stage process to create outcomes for this client.
• Stage 1: Met with key stakeholders to determine key issues that the city is facing (such as safety, sanitation etc) and current projects in situ.
• Stage 2: Held a workshop session with key government members to recognize, analyse and agree on projects of high priority (i.e. smart parking, WiFi, Grid management etc).
• Stage 3: To Finalize a report with key recommendations and plans for which initiatives are most suitable from an external perspective and initial steps to take.
• The project involved using various Frost & Sullivan resources from both primary and secondary sources.

RESULTS
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<td>Smart Cities and the Impact on Fintech Innovation: The Next Smart Revolution</td>
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<td>Technologies Empowering Smart Healthcare</td>
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<td>Impact of Urbanization on Waste Management in Southeast Asia</td>
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<td>Utilities as a Client</td>
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<td>Connected Devices and Growth of Global RFID Market</td>
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<td>Global Public Safety Networks Market, Forecast to 2020</td>
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<td>Building a Global-scale City Open Innovation Platform - Impressions from the Connected Smart Cities Conference, 2016</td>
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<td>Scaling Smart City Innovation—International Development of Start-ups</td>
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<td>An End User Perspective on Navigating Digital Transformation in Energy and Utilities, Global, 2017</td>
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<td>United States Video Surveillance Market</td>
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<td>Future of Big Data Analytics, Related Business Models, and Automotive Use Cases</td>
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<td>Global Mobility Market Strategic Profiles of Key Participants, 2016</td>
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<td>Global Connected Car Market Outlook</td>
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<td>Smart Cities of West Africa, Forecast to 2030</td>
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<td>Future Smart Cities of Southern Africa</td>
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<td>East African Smart Cities, Forecast to 2030</td>
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<td>Next Generation Sensors for Wearables and Smart Phones</td>
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*This list is not exhaustive*
About Frost & Sullivan
50 years of global expertise in over 40 offices

• 50 years+ of experience of research and consultancy
• 40+ offices worldwide ⇒ global coverage & local expertise
• Deep sector-based expertise
• 1,500+ employees across the globe, of which >800 consultants & analysts
Industry Convergence
Comprehensive Industry Coverage Sparks Innovation Opportunities

- Aerospace & Defense
- Measurement & Instrumentation
- Consumer Technologies
- Information & Communication Technologies
- Automotive Transportation & Logistics
- Energy & Power Systems
- Environment & Building Technologies
- Healthcare
- Minerals & Mining
- Chemicals, Materials & Food
- Electronics & Security
- Industrial Automation & Process Control
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