FROST & SULLIVAN

Smart Cities

Frost & Sullivan Value Proposition

"We Accelerate Growth"

A Frost & Sullivan Accelerated Program

Smart City Highlights

Massive innovation drives strong growth

1. 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

2. 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.

3. 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. .

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

5. 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

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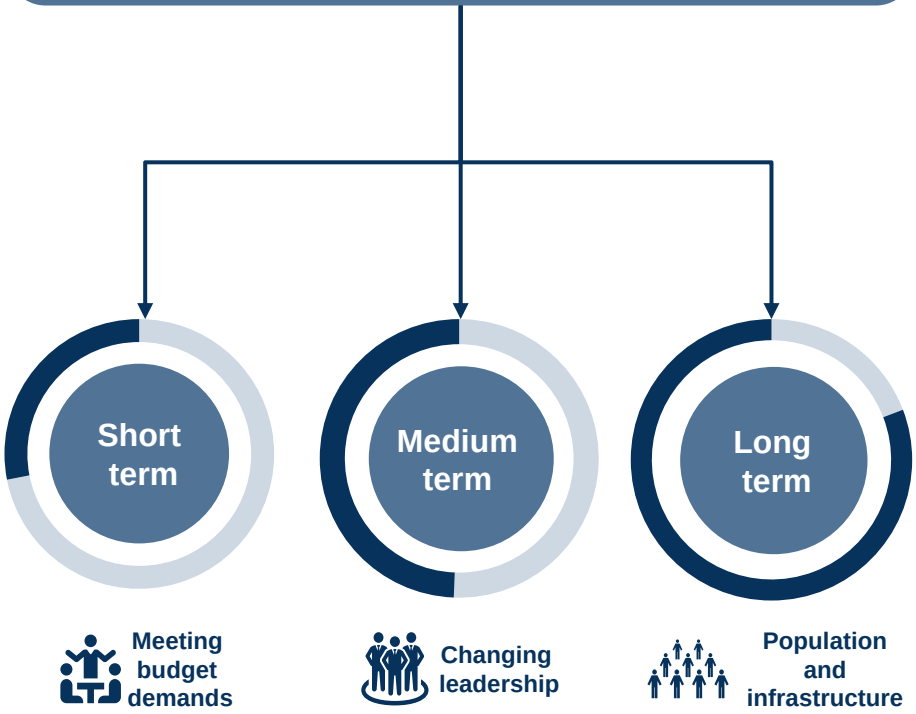
Cities are complex and evolving economies that must be focused on

Numerous factors are putting a strain on cities..



…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

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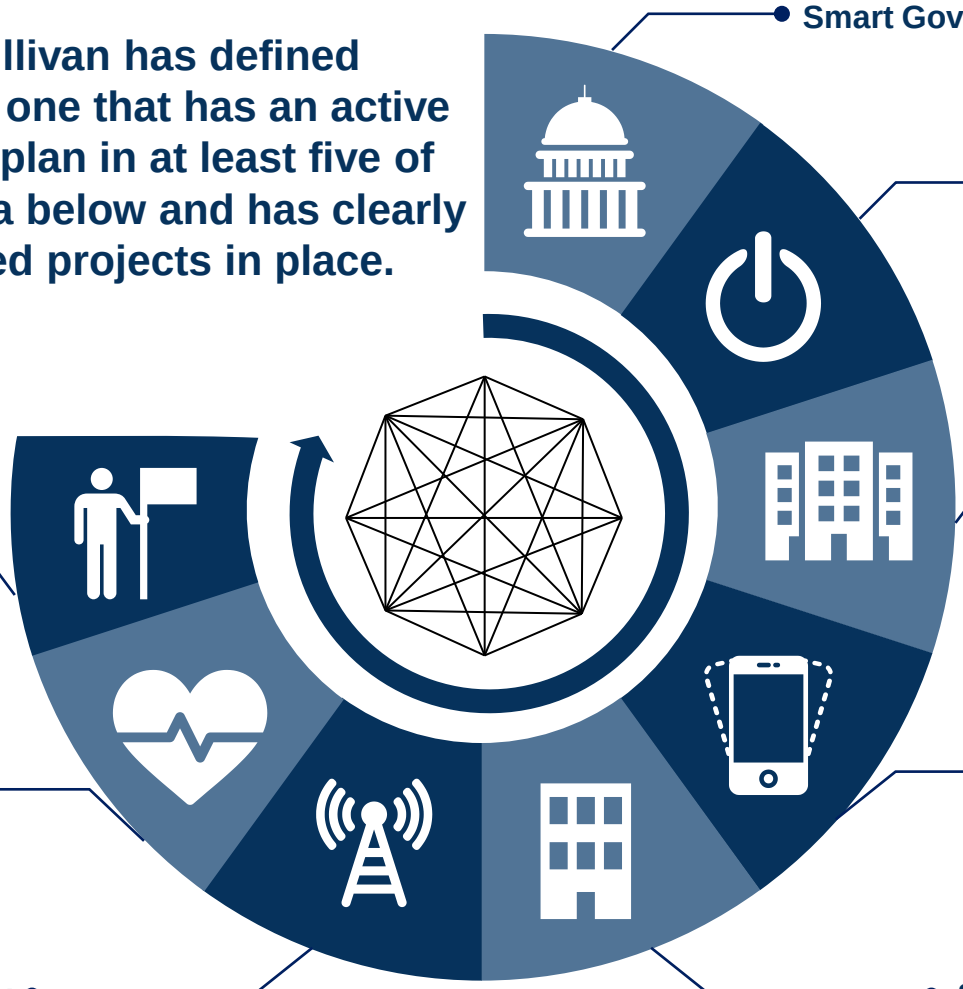
Definition of smart city

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.



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

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

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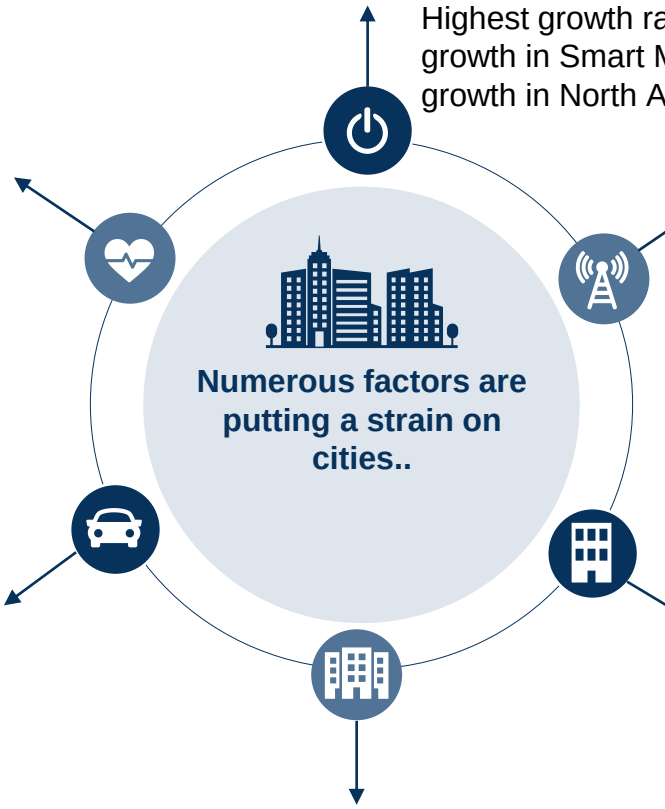
Smart city market smart cities to create huge business opportunities with a market value of $1.56 Trillion by 2025



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 TRANSPORTATION
Market value: $423 billion by 2025 Market growth in Latin America, Middle East & Africa, and CIS + Eastern Europe. Latin America will have about 50% growth in smart transportation by 2025

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

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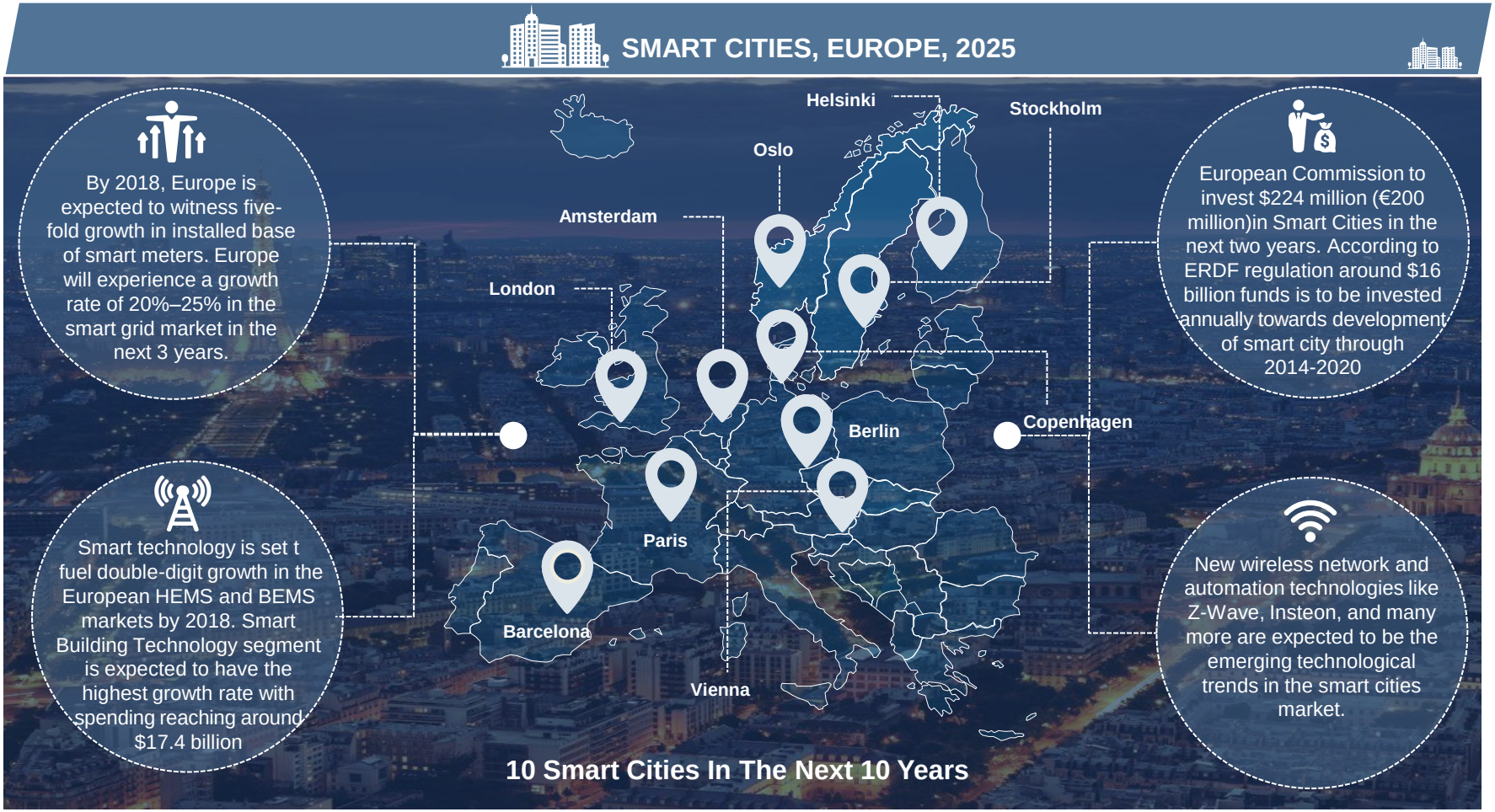
Future Smart Cities of Europe



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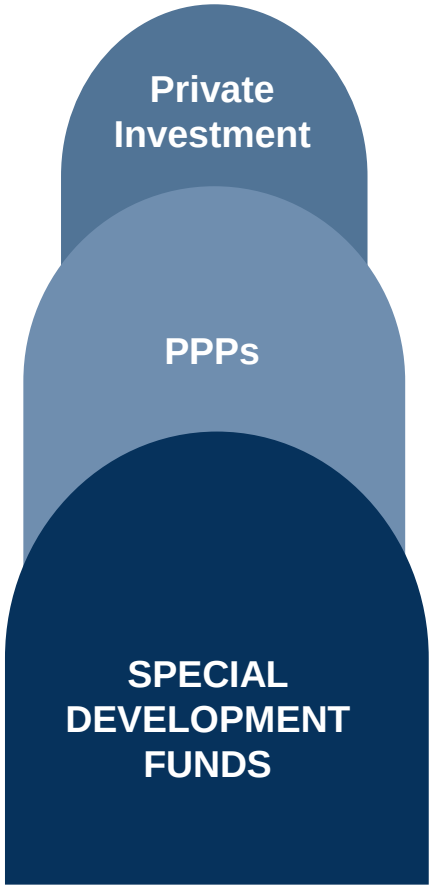
Investment and funding of smart cities in Europe

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)

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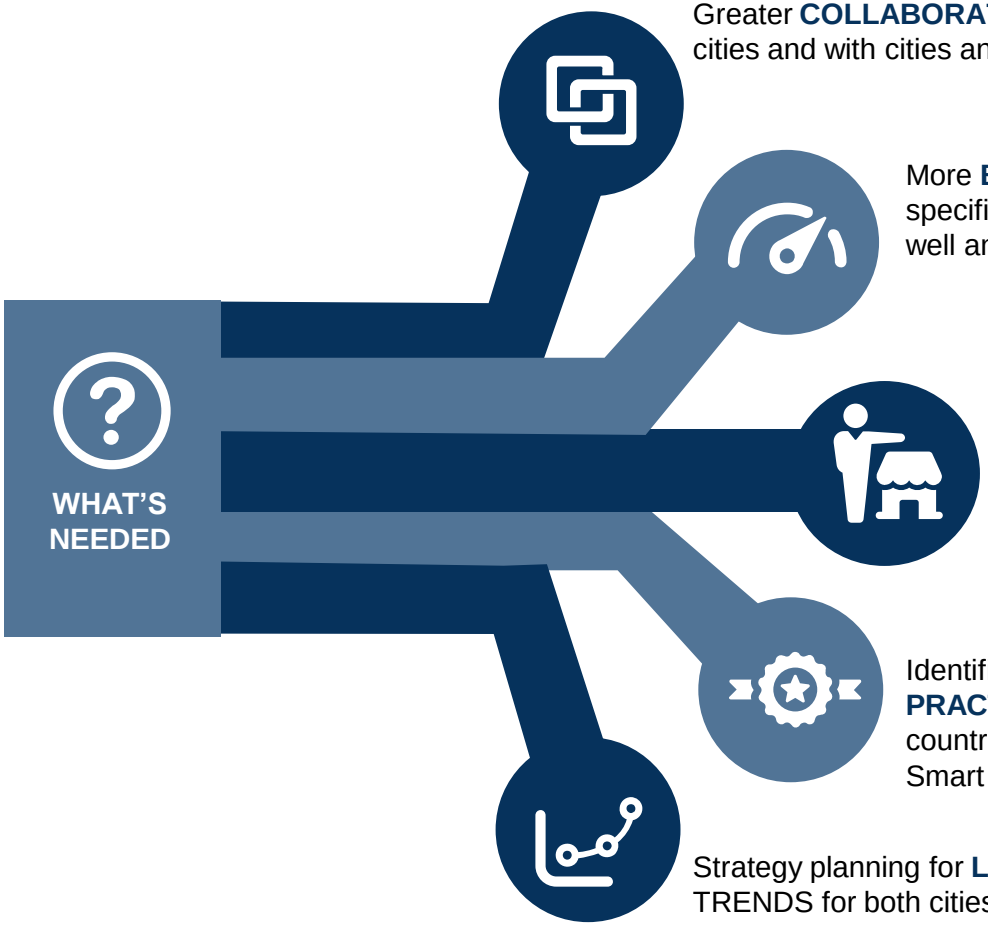
Frost & Sullivan helps cities and suppliers find ROI and opportunities



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**

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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

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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

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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.

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3 City growth workshops a systematic process to understand smart cities and uncover growth opportunities

A basic strategic action plan for the most attractive and best fit opportunities that accounts for and minimizes risk.

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

Client	Project Title	Description	Project Duration
Central America Capital City	Smart City Evaluation and Opportunity Identification	Workshops, we led discussion and education of smart cities to all government leaders, drove opportunity identification and analysis development	5 months
Major US City	Developing a Smart City	Led initial awareness of a smart city for the City and assisted in creating business model and consortium for developing smart city activities	1.5Years+
Major Turkish City	Smart City Blueprint and Strategy	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.	Two months
Major US City	Living Lab Creation	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.	8 months
Major Brazilian City	Port development	Identified smart city projects to undertake in the Port area of the City . Led to several new initiatives such as security and lighting.	12 months
Leading Semiconductor Co	Smart Cities Awareness and Opportunities	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	4 years+
Major Integrator	Smart City Opportunity Analysis	Workshop and consulting to build a smart cities practice for Maxim. Involved identifying areas of focus as well as internal implementation skills required	5 months
Global Fortune 100	Confidential	Assistance in development of strategy for cities business	2 years 4 months
Leading US City	eMerge Americas	Developed content for an run each year for last 4 years the eGov summit held in Miami	4 years+
Mobility Player	Future or Cities	Workshop to define the role of Miobility Player in cities of the future	3 months

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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

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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.

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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.

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Case Study 4
How do we Better Understand the opportunity that exists in Smart Cities?

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.

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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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Smart Cities Research: Tools & Resources Accessible: Research Content and Expertise
Extracts of research titles published in the year 2017
Building Trust in Consumer-Facing IoT Systems
Smart Cities and the Impact on Fintech Innovation: The Next Smart Revolution
Innovations in Urban Farming
Innovations in Smart Water
Growth Opportunities for Smart Citizen Services in eGoverment
Smart Cities and Security - Are Governments Doing Enough to Keep Their Citizens Safe? 2017
Smart Cities Funding Models
Reframing Smart Technology for the Smart City
Digital Health Market Profile—Fitbit
Innovations in Smart Sensors
Digital Health Grows Up- Is Pharma Guiding the Way?
Technologies Empowering Smart Healthcare
Top Technologies in Health and Wellness, 2017
Global Smart Card Market

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Global Urban Rail Vehicle Database, 2016
Impact of Urbanization on Waste Management in Southeast Asia
Utilities as a Client
Connected Devices and Growth of Global RFID Market
Global Public Safety Networks Market, Forecast to 2020
Building a Global-scale City Open Innovation Platform - Impressions from the Connected Smart Cities Conference, 2016
Open Data Strategies of Real-time Cities
Global City Surveillance Market, Forecast to 2022
Scaling Smart City Innovation—International Development of Start-ups
Open Data Strategies in Real-time Cities—Cambridge (UK) and Kazan (Russia)
Smart Cities and Security—Are Governments Doing Enough to Keep Their Citizens Safe?, 2017
Growth Opportunities for Smart Citizen Services in eGovernment
An End User Perspective on Navigating Digital Transformation in Energy and Utilities, Global, 2017
North American Digital Grid Communication Infrastructure, Forecast to 2023

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United States Video Surveillance Market, Forecast to 2023
Future of Big Data Analytics, Related Business Models, and Automotive Use Cases, Forecast to 2025
Intelligent Mobility Future Business Models in Connected and Autonomous Mobility
Global Mobility MarketStrategic Profiles of Key Participants, 2016
European Bike Sharing Market, Forecast to 2025
Global Urban Rail Vehicle Database, 2016
Game-changing Automotive Policy Developments in Africa, 2016
Global Connected Car Market Outlook, 2017
Mobility Trends in Vietnam Ho Chi Minh City, Forecast to 2022

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Examples of research titles published in the year 2016
Smart Cities of Africa, Forecast to 2030
Smart Cities of West Africa, Forecast to 2030
Future Smart Cities of Southern Africa
East African Smart Cities, Forecast to 2030
Next Generation Sensors for Wearables and Smart Phones
Global Smart Water Meter Market
Global Smart Gas Meters Market
IoT Enabled Smart Buildings Market
Future of Smart Agriculture in the Asia-Pacific Region
Smart CoatingsRedefining Functional Boundaries
An Insight into Smartphone Plans, Pricing, and Purchasing
The Turkish Smart Grid Market
RFID in the Global Smart Cold Chain Market
Innovations in Smart Lighting (TechVision)
A Snapshot of the Brazilian Smart Metering Market

This list is not exhaustive

About Frost & Sullivan

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

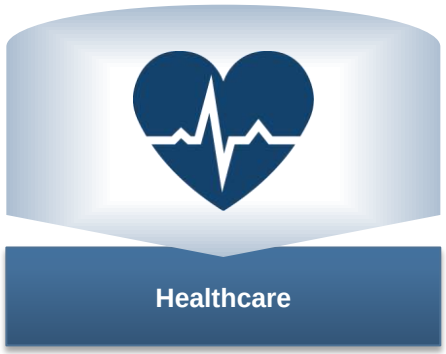
Consumer Technologies

Information & Communication Technologies

Automotive Transportation & Logistics

Energy & Power Systems

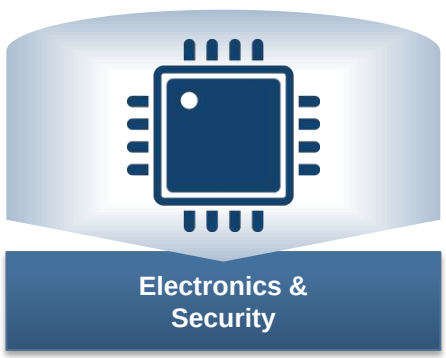
Environment & Building Technologies



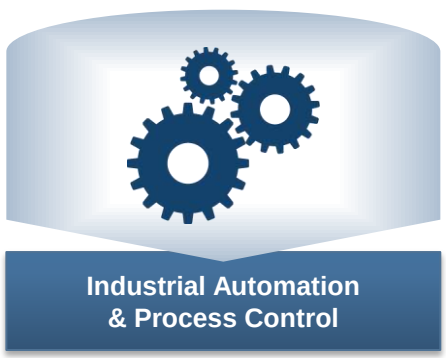
Healthcare

Minerals & Mining

Chemicals, Materials & Food



Electronics & Security



Industrial Automation & Process Control

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