



# Smart Cities Capability Deck







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## Foreword

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### **Smart Cities: A Capability Deck of U.S. companies in India**

India's Smart Cities Challenge began in June 2015 with the selection of 100 smart cities that were invited to submit competitive plans for deploying capital in support of smart infrastructure development. The Smart Cities initiative envisions public-private partnerships (PPPs) and municipal bonds filling large portions of the funding gap. Private sector participation is needed in order for public sector entities to leverage access to private sector financing. This need to raise funds will open market opportunities to domestic and foreign investors interested in public-private partnerships in many sectors, including IT infrastructure, energy management, environmental sustainability, GIS mapping, engineering, and sanitation

To facilitate public-private partnerships, India is relaxing access to its urban infrastructure and services sector for private investment. Several services, typically provided by governmental bodies, will be licensed to private companies, which could be involved in everything from the construction stage to operations. The largest sectors that are being targeted for PPPs are in areas with significant unmet infrastructure needs, such as water supply, waste management, and transportation. In this regard it has been seen that the private public partnership model has shown promise and has a potential to grow. The private sector has therefore been invited and encouraged to participate equipped with better resources and know how to execute projects. Thus far, PPP commitments have already been made by leading U.S. companies such as CISCO, IBM, HP, Honeywell, Xylem, Oracle, KPMG, AECOM, Trimble, PWC, Microsoft and others, but many more opportunities exist. Beyond basic infrastructure needs – roads, transport, housing – Smart Cities will also channel private investments into urban India's social infrastructure in areas such as healthcare, safety, and education

Smart cities agenda is a great opportunity for U.S. and it offers immense opportunities of cooperation between U.S. and India. In the present context various agencies of the two governments provide leadership and direction on a range of issues covering infrastructure policy, planning, execution, financing & implementation. Policy initiatives are key to moving things forward in the infrastructure sector. It is equally important to put in place a sound technical infrastructure for information exchange across the infrastructure sectors of smart cities, airports, ports, roads and highways, railways, dedicated freight corridors, water/sanitation, safety and security.

AMCHAM seeks to advocate and advance project development opportunities for U.S. private sector participation in some of the key areas falling within established U.S. expertise. The U.S. private sector through AMCHAM and the Energy Co-operation Program (ECP) is working closely with the U.S. Foreign Commercial Services (FCS) U.S. Trade and Development Agency (USTDA) and several financial institutions.

This Smart City Capability Deck will function as a rich resource base outlining the competitive and cutting edge technologies of U.S. expertise, products, services, know-how and solutions in the field of infrastructure, energy and smart city domains. The deck will be used extensively by decision makers, promotional agencies and institutions to show case and demonstrate the impressive capability of U.S. companies and will bridge the information gap between the supplier and user segments. We are confident that the deck will provide the much needed impetus to infrastructure development projects in the country by playing a complementary role to various Indian and U.S. agencies within the Infrastructure Collaboration Platform.

**Ranjana Khanna**

Director General-CEO

AMCHAM India





Established in 1992, the American Chamber of Commerce in India (AMCHAM India) is an association of American business organizations operating in the country.

AMCHAM India has around 500 members, spread across the nation.

The Chamber enjoys a close relationship with the US Embassy in India, which supports its objectives and helps in fulfilling them. The incumbent US Ambassador to India is the Honorary President of AMCHAM.

## MISSION

### **AMCHAM's principle objectives are to:**

- a) Promote activities that encourage and stimulate investment by US companies in the country.
- b) Support the business operations of its members.
- c) Encourage bilateral trade between India and the US.

These primary objectives are fulfilled by:

- Providing a forum for US-based business organizations in India to discuss and identify common issues, economic and commercial interests in India and/or the US.
- Giving an opportunity to its members to express their views and opinions, especially in the areas of trade, commerce, finance, services, industry, agriculture and related issues; to understand and give effect to such opinions.
- Instituting Sectoral Committees which implement the primary objectives in their respective sectors.
- Reviewing policies and procedures in various sectors that affect the members as well as growth of foreign direct investment.

### **AFFILIATIONS**

AMCHAM is affiliated to the following chambers:

- Chamber of Commerce of USA in Washington, D.C.
- Asia Pacific Council of American Chambers of Commerce (APCAC).
- AMCHAM's in other countries.

### **REGIONAL CHAPTERS**

AMCHAM's National Secretariat is based in New Delhi with six Regional Chapters in Bangalore, Chennai, Delhi, Hyderabad, Kolkata and Mumbai.



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Business Description	Core Competencies	Energy			Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
		Power	Renewables Generation	Smart Grid									
Manufacturing of Industrial products and provide of services in the field of Safety & Security, Energy, Health care.	System Integration for Large projects												
	Products & services	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Business Model	Consulting programs and project management				✓	✓		✓	✓	✓	✓		
	Social Inclusiveness												
Proposition for Infrastructure projects/Smart Cities	Governance & Delivery Programs												
	Data Analytics & Financial Services												
	Design and manufacture of critical motion control components												
Key Infrastructure Clients	Sub system Integration capability												
	Power Utilities												

Proven experience / case study		Key Financials	
NA	Turnover	INR 1800 crore	
	Proposed Investments	NA	

# 3M Capability Deck for INDIAN SMART CITIES



**Building India's Future Fulcrum of Growth:  
Smart Physical, Knowledge and Social Infrastructure**

## Utility management

- **Sensored electrical terminations**
  - Enables micro-grid utilization
  - Reduces fault detection and outage time
- **Mapping of underground assets based on RFID marker system**
  - Enables precise location identification of assets
  - Ease of location identification
  - Asset position can be mapped to GIS
- **Water monitoring and management (partnership with Takadu for analytics)**
- **Aluminum Conductor Composite Reinforced (ACCR)**
  - High strength, lightweight for large spans
  - 2x amp capacity
  - Reduced installation time
- **Air purification by using 3M Filtrete systems**
  - Purifying air in a building can be made smarter and simpler by using patented 3M technology and products
- **Smart detection systems for gases and particle**
  - We can detect % level of gases such as CO, CO2 and particle in the atmosphere
- **Safety communication devices**
  - Blue tooth enabled ear muffs which will cut off all noises more than 60 dB. This can be connected between multiple people for communication
- **3M smart safety tapes / garments**
  - Multiple solutions for safe walking
    - i. 3M anti skid tapes
    - ii. 3M fluorescent tapes
    - iii. 3M reflective garments
- **Air purification for crowded places**
- **Infrastructure Protection Coatings**

## Smart Building

- **LED high efficiency lighting Free flow tolling – design and install**
  - Long life, less energy, less maintenance
- **Environment aware and networked lighting**
  - Self dimming, remotely controlled LED lighting
  - Color changing (manual, or in response to ambient light)

- **Ducted lighting solutions**
  - Tubular Day lighting Systems
  - Sustainable light for indoor applications
  - Guiding sunlight into dark areas
  - Saves electricity
  - Reduction of carbon foot prints
- **Envision Lighting**
  - Reduces the electric power used to brighten a signage. These films in combination with LED will reduce power consumption and usage of conventional tube lights.
- **Solar RPM**
  - Differentiated solar powered RPM with high strength plastic body, unique light guide system and micro controlled circuit for lighting road pavements
  - Energy source powered by sunlight
- **Window films**
  - Sun Control films: save 1 ton of AC per 100ft<sup>2</sup> (9.3m<sup>2</sup>) exposed glass
  - Safety films: weather, break in, bomb protection
  - Daylight redirecting: Natural light deeper into building, reduced use of artificial lighting (up to 50%+ with active light management)
- **Passive Optical LAN**
  - Fiber to the desktop solution – no power required
  - Simplified installation, reduced space, reduced CapEx
  - Gigabit capacity
- **Commercial Filtration: multiple offerings**
  - Low pressure drop = less fan energy usage
  - Better filtration = healthier air
- **Multiple offerings for efficient data center operation**
  - Open Bath Immersion Cooling
  - Novec Fluids
- **DG3 signage: no artificial light required**
- **PVC free non-woven signage**
  - Recyclable alternative for PVC at low cost
  - Sustainable solution comply to RoHS standards
  - Reduces carbon foot print
- **Air barrier film**
  - Air and vapor envelope protection
  - Up to 40% reduction in building heating / cooling energy costs



## **INTRODUCTION TO 3M**

### **3M - A Global Innovation Company**

3M is the global innovation company that never stops inventing because we are passionate about making progress possible. Our people capture the spark of new ideas and transform them into thousands of ingenious products and practical applications that help make people's lives better. 3M has over a 100 year track record of being one of the most innovative companies worldwide.

With \$30.8 billion in sales and operations in more than 70 countries, 3M sells more than 55,000 products and employs more than 88,000 people worldwide (12000+ researchers) who collaborate actively to design, manufacture and engage in the delivery of innovative products & services. 3M leverages its diverse 46 technology platforms that combine in unique and imaginative ways, leading to innovative solutions for a variety of markets like Industrial, Healthcare, Safety& Graphics, Energy and Consumer.

3M has been awarded close to 671 (US patents) and a total of 3,300+ patents globally in 2013. In 2014, 3M crossed an innovation milestone when it was granted its 1,00,000th patent. 3M is also one of the 30 companies in the Dow & Jones Industrial Average and a component of the Standard & Poor's 500 Index.

The combinations and applications of technologies derived from the 46 technology platforms across the company constantly bounce between and across our five business areas, keeping the 3M innovation proposition constant, fresh, and dynamic.

### **Our Values**

- Act with uncompromising honesty and integrity in everything we do.
- Satisfy our customers with innovative technology and superior quality, value and service.
- Provide our investors an attractive return through sustainable, global growth.
- Respect our social and physical environment around the world.
- Value and develop our employees' diverse talents, initiative and leadership.
- Earn the admiration of all those associated with 3M worldwide.

### **3M at a Glance (Year-end 2013)**

- Global sales: \$30.871 billion.
- International (non-US) sales: \$19.7 billion (64 percent of company's total).
- Operations in more than 70 countries.
- 3M products sold in nearly 200 countries.
- 88,000 employees globally.
- 2013 3M gives cash and product donations totalled \$60.2 million.

### 3M Technology Capability

- 8,400 researchers worldwide; 4,400 in the U.S.
- Patents Awarded – U.S. 671; Total 3,330

### **Innovation is Our Business**



### 3M IN INDIA

3M was established in India in 1988 and has completed more than 25 years of operations. 3M headquarters is based in Bengaluru with branch offices at Mumbai, Gurgaon, Pune, Kolkata, Hyderabad and Chennai. 3M leverages its global innovation expertise to develop homegrown solutions that address unique needs of diverse customers in Indian markets. 3M has invested in Innovation Centers at Bengaluru and Gurgaon to boost local product development and its manufacturing footprint is spread across Bengaluru, Pune and Ahmedabad. From products that improve manufacturing efficiency and impact improved healthcare delivery to safety markers that help increase road visibility, everyday kitchen aids and car care products, today, 3M innovation touches millions of Indians – making lives easier and better.

- 3M India Sales: Rs 1,742 crores for 12 months ended March 31st 2014
- Headquarters at Bengaluru
- Manufacturing facilities at Bengaluru, Ahmedabad, Ranjangaon (Pune) & Pimpri (Pune)
- R&D centers at Bengaluru and Gurgaon with more than 125 research professionals
- Branch offices at Gurgaon (NCR), Mumbai, Kolkata, Chennai, Pune and Hyderabad
- Over 1700 employees



## **3M CAPABILITY DECK FOR SMART CITY**

### **Interpretation of Smart Cities Initiative: 3M Perspective**

Today, urban performance relies on not only physical infrastructure but also knowledge and social infrastructure. In these integrated Smart Cities investments in human and social capital and traditional yet modern infrastructure like transport is complemented by modern communication infrastructure fueling economic development, higher quality of life, and wise management of resources. <sup>1</sup>

3M's experience with cities that are moving in this direction shows that businesses, workers, families in Smart Cities create a fulcrum of growth and prosperity. Smart Cities are citizen centric.

### **Anticipated role: How 3M can contribute?**

Four main models that will be used, through which companies will engage with city authorities to develop smart cities are: Build Own Operate (BOO), Build Operate Transfer (BOT), Build Operate Manage (BOM) and Open Business Model (OBM). Smart City participants will assume one or more of the four main roles in such engagements – integrators (the end-to-end service provider); network operators (the M2M and connectivity providers); product vendors (hardware and asset providers); and managed service providers (third-party providers overseeing management / operation of smart solutions / services). 3M predominantly is a Product Provider to other three parties.<sup>2</sup>

### **Expectation from Government – Policy / Financial / Institutional Mechanism / Interventions**

Indian government needs to reduce risk to investors to increase foreign investments in India. Indian Government recently relaxed FDI rules, a step in the right direction. Installation, planning and maintenance of technologies need both local and global-class players. The cheapest products produce the cheapest infrastructure. Reduction of trade barriers to allow the best technologies are implemented is a must. Finally India needs external financing. Its PPP laws need to reflect flexibility to accommodate national budgets, multilateral bank funding, and private capital. Open dialogue, flexibility, commercial diplomacy and recognition that goods, domestic or foreign, generate jobs in India for those who install and support them for the life of the city should offer ample political capital to ease regulatory and procurement complexity and foster flexibility and openness.

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<sup>1</sup> Caragliu et al. 2009, paraphrased. Graphics Frost & Sullivan.

<sup>2</sup> Frost and Sullivan Strategic Opportunity Analysis of the Global Smart City Market™ 2013

### Experiences & best practices in other countries or India- How 3M have contributed so far

Success in developing a Smart City requires engagement and partnership amongst three key entities: Governments, Project Financiers and Prime Contractors and their Suppliers. 3M is a global supplier providing solutions today to the majority of the Smart Cities under development in the world with product portfolios in national infrastructure, health care, safety, security and defense. 3M technologies and services help address Smart City needs. Amongst 3M's 50,000 products we have chosen examples in eight categories summarized in the table below.

Theme	Smart Segment	3M Solution
Traffic Management	Smart Mobility	3M Traffic cameras and tolling infrastructure enable cars to efficiently use the road without slow done at toll plazas.
Public Safety	Smart Governance	Vehicle license plate identification increases security and safety. Highly reflective road signs reduce accidents and fatality
Parking Optimization	Smart Infrastructure	3M Parking Management System directs travelers to the most optimum locations improving transportation and mobility
City Lighting	Smart Energy	3M LED lights dramatically reduce electrical consumption and cost and increase service life of city lighting infrastructure increasing safety and security
Data/ Asset Management	Smart Technology	Sensors and electronics increases need for data centers. Smart cities spend 20% of the energy on data centers. 3M cooling fluids provide energy efficiency means to dramatically reduce data center energy foot print.
Power Water	Smart Energy Smart Infrastructure	3M AACR cables reduce number of transmission towers by 2/3 as they can carry 3 times the electricity of steel cables. Smart terminations allow renewable and fossil fuel energy sources to be blended seamlessly.
Energy Efficiency	Smart Buildings	3M infrared reflective yet visible light transparent films reduce building heating therefore lowering cooling costs
e-Health	Smart Healthcare	3M Diagnostic Related Group data dictionaries assures consistent and high quality care is offered everywhere in the city.
Waste, Pollution and Environmental	Smart Buildings	A variety of 3M products minimize fuel consumption due to efficient transport reducing pollution with less environmental impact.



## **3M capabilities for Smart Cities**

3M provides a host of innovative and cost-effective smart solutions to address several city wide issues. They are:

### **Traffic management**

- **Congestion solutions**
  - Free flow tolling – design and install
  - Congestion charging
  - Access management
  - Real time speed and journey time algorithms
- **Low emissions zone (limited time, access management)**
- **Efficient traffic**
  - Design for efficiency using standard approaches
  - Sign design and install services
  - Sign inventory (location and content of all signs)

### **Parking optimization**

- **Automated parking management – total solution**

### **Smart Grid**

- **Effective transmission and efficient energy consumption**
- **Increase transmission capacity of electricity without the need to build new power lines**
- **Solutions enable fossil fuel power generation and renewable to be mixed and balanced**

### **Asset management**

- **Automated vehicle registration - RFID linked**
- **3M SIMS: Smart Infrastructure Management System**
  - Web enabled centrally supervised access control and monitoring of network equipment and assets in outdoor locations (e.g. substations, cabinets, manholes, etc)
  - Access to secured assets centrally managed via battery-less RFID transponder
  - Monitors operational data and identifies faults
- **3M Biometric Solutions**
  - Finger print based access control systems which can be collected and controlled through a central data base for the complete facility. This can be used for attendance management.

Business Description	Core Competencies	Energy		Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence	
		Power	Renewables Generation									Smart Grid
<p><b>Business Description</b></p> <p>Accenture is one of the world's leading organizations providing management consulting, technology and outsourcing services, with more than 305,000 employees; offices and operations in more than 200 cities in 56 countries; and net revenues of \$30.0 billion for fiscal 2014. Our four growth platforms-Accenture Strategy, Accenture Digital, Accenture Technology, Accenture Operations-are the innovation engines through which we build world-class skills and capabilities; develop knowledge capital; and create, acquire and manage key assets central to the development of integrated services and solutions for our clients. Accenture delivers its services and solutions through 19 focused industry groups in five operating groups which includes including Infrastructure, Energy and Smart Cities industries.</p>	System Integration for Large projects		✓	✓		✓	✓	✓				
	Functional and Technical Architecture for large projects		✓	✓		✓	✓	✓				
	Consulting programs and project management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Social Inclusiveness					✓						
<p><b>Business Model</b></p> <p>Accenture offers end to end services from strategy consulting, governance, project management, system integration and support/maintenance. Accenture technology and vendor agnostic approach help customers to build architecture on open platform to reduce the TCO. We also have a very large partnership network which keep on evolving based on customer requirements.</p>	Governance & Delivery Programs		✓	✓	✓	✓	✓	✓				
	Data Analytics & Financial Services		✓	✓	✓	✓	✓	✓				
	Technology											
<p><b>Proposition for Infrastructure projects/Smart Cities</b></p>	Product											
	Services		✓									
	Solutions		✓									
<p><b>Key Infrastructure Clients</b></p>	<p>Smart Cities: Amsterdam, Netherlands; Yokohama, Japan; Fujisawa, Japan; Songdo, Korea; PlanIT Valley, Portugal; London, UK; Madrid, Spain; Copenhagen, Denmark; Baerum, Norway; CCD, Mexico</p>											

### Proven experience / case study

Smart Cities Case Studies Attached

### Key Financials

Turnover

Net Revenue - US\$30.0 billion for fiscal 2014 (12 mos. ended Aug. 31, 2014)

For more details pls visit <http://newsroom.accenture.com/fact-sheet/>

Proposed Investments

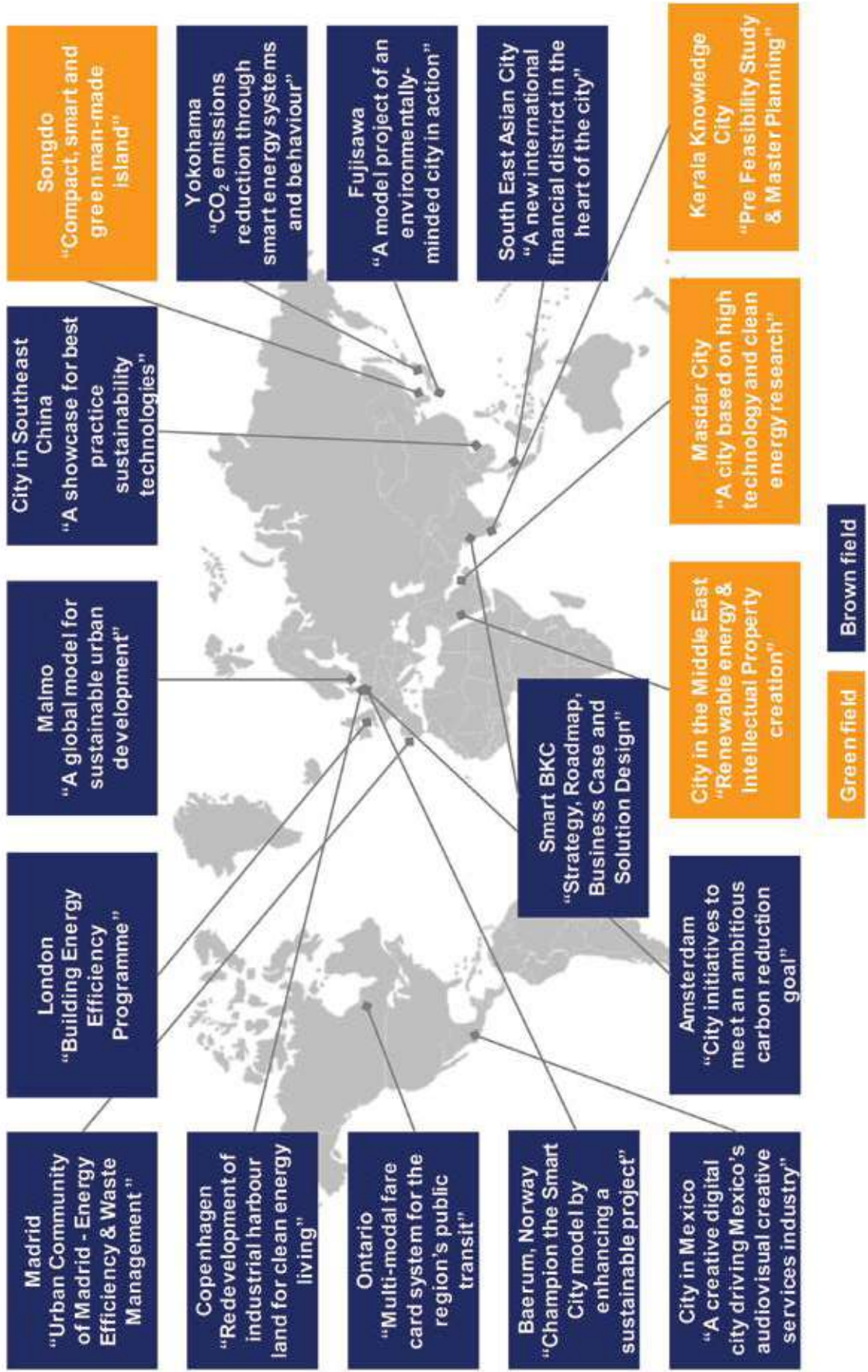


# Accenture Smart City Capability Overview



Strategy | Digital | Technology | Operations

## Accenture has significant experience in Smart Cities around the globe





We also have significant experience of working with Developers, EPC players and other industry players



## Agenda

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- Our Point of View on Smart Cities
- Accenture Capabilities in Smart Cities
- **Case Studies**



## Smart BKC Strategy, Roadmap, Business Case & Solution Design

### Business Challenge

Bandra Kurla Complex (BKC) was instituted by MMRDA as an International Financial & Business hub; MMRDA now wants BKC to develop into a smart city. In Phase 1, Accenture has helped MMRDA to define Vision, Strategy & Roadmap for Smart BKC. In Phase 2, Accenture has created the business case, revenue model and Smart City Solution design.

### How Accenture Helped

- In Phase 1, Accenture has defined the Vision, Strategy and Roadmap for Smart BKC.
- In Phase 2, MMRDA wanted Accenture to evaluate the five selected solutions on the following parameters: Use Case, Design Architecture, Financial Viability, Stakeholder Benefits, Vendor Landscape, also provide relevant Case study examples and recommend the feasible option. The five options were
- BKC-wide Wi-Fi: Providing seamless Wi-Fi coverage throughout BKC
  - Smart parking: Installing sensors in existing parking lots to enable citizens to park smartly
  - Intelligent streetlights: Installing time and motion sensors, solar panels and LED lights on streetlights
  - Video surveillance and analytics: Installing PTZ and fixed cameras at important areas and running analytics on the camera feed to identify anomalous situations
  - Citizen app: A one stop shop app for all things BKC related from signing up for smart parking to knowing about restaurants in the area

### Value Provided by Accenture

- For each of the identified options created a technical architecture of how the solution could be implemented
- Created before and after use cases to demonstrate the value added by the initiatives
- Computed revenue streams and costs for each of the five initiatives
- Created detailed financial analysis based on discounted cash flow as well as economic value added analysis to analyze IRR, NPV and payback period for individual initiatives as well as consolidated solution
- Compiled case study examples
- Compiled vendor landscapes
- Compiled stakeholder benefits
- Created a roadmap for procurement and build stages as part of next steps



## Kerala Knowledge City Pre Feasibility & Master Planning

### — Business Challenge

Government of Kerala wants to create a knowledge and **Smart city**

**Intellectual Property:** The city's economy must be based on industries specializing in managing and growing intellectual capital

**Self Sustaining:** The city must be a fully integrated township with mixed land usage – educational, residential, commercial and industrial

### — How Accenture Helped

Carried out pre-feasibility studies to determine the various aspects of bringing about socio-economic prosperity through knowledge intensive activities in this proposed project

- **Assessments** to identify the opportunities and risks involved in Kerala's macro-economic environment
- **Industry research** to outline the most attractive industry segments in Kerala
- **Develop a Master Plan** on a high to realize the potential, requirements and challenges of the project
- **Define the financial feasibility** with the help of an in-depth cost based business case
- **Outline a strategy** with a detailed execution roadmap , implementation approach, clear vision and goal setting and partnership management strategies for potential contractors involved

### — Value Provided by Accenture

- Achieved a clear understanding of **current infrastructure gaps** (physical and soft-infrastructure) and **opportunities** within the city
- Identified **target industry segments** and sub-segments and defined distinct market sizes of the same
- Provided a **realistic view of real estate investment** required, IRRs etc.
- Provided a clear understanding of **operating model structures** to drive efficient public-private collaboration
- Clearly laid out next steps and **timelines for accelerated execution**

## Smart City Yokohama Supporting the Creation of a Smart City

### Business Challenge

The city of Yokohama aims to reduce CO2 emissions and also to stimulate economic development by exporting next generation energy solutions developed within the city to other markets in Asia.

The City of Yokohama needed support to meet its two key objectives:

- To establish “Yokohama-model solutions” by 2014, which can be introduced to cities in other countries
- To introduce 27 MW of photovoltaic systems, the Home Energy Management System (HEMS) to 4,000 households, and 2,000 electric vehicles.

These were part of broader national targets: 30% CO2 reduction and a 10 fold increase in renewable energy by 2025.

### How Accenture Helped

Accenture supported the development of the city over three core phases; the initial conceptualization phase, the Master Plan development and the execution phase:

- **Initial Conceptualization:** Developed the vision of Smart City Yokohama based on detailed trend analysis on smart grids and smart cities, and their applicability to Yokohama.
- **Master Plan Development:** Co-ordinated partner companies to develop a five year master plan for Yokohama Smart City and defined a roadmap for developing HEMS, BEMS, CEMS and EVs technologies, which aligned to R&D schedules.
- **Execution Phase:** Provided overall **project management** and defined the **governance structure**. Completed a system integration to develop a back-end system. Identified the regulatory changes required to support new infrastructure and developed the city’s external marketing strategy.
- Specifically, Accenture now **supports** Yokohama city to develop “Yokohama model” to reconstructed Tohoku area and export YSCP to friendship cities(2012).

- **Smart City vision** defined and communicated externally
- Pilot region for the city identified and initial partnerships with companies established

- **Five year master plan** for Yokohama Smart City project defined collaboratively with partner companies
- **Detailed cost-benefit analysis** and **feasibility assessment** of low carbon technologies
- Defined **implementation roadmap for technologies** (HEMS, BEMS, CEMS and EVs) and alignment of their R&D schedules with the city masterplan
- Streamlined decision-making and established clear project responsibilities
- Coordinate relationship with Tohoku area (during the adjustment, 5/2012)



## Amsterdam Smart City City Wide Carbon Reduction

### Business Challenge

- Future energy dynamics require an upgrade of current electricity networks to smart grids
- Following the EU 20/20/20 climate goals, Amsterdam has set climate goals that are even more ambitious:
  - CO<sub>2</sub> neutral municipality by 2015
  - 20% renewable energy in 2025
  - 40% reduction in CO<sub>2</sub> emissions in 2025 (1990 baseline)

### How Accenture Helped

- ASC objective: ASC is designed as an accelerator for climate programs/ smart grid development, bringing parties together and initiating pilot projects that reduce CO<sub>2</sub> and yield local best practices for full scale roll out
- ASC Structure: 4 workstreams (focus areas) enabled by SmartGrid technology
- Current status: Several pilots started Q2 2009. Initiation of 'Accenture Smart City Network' . Over 16 partners

### Applied technologies

- Smart meters
- Energy displays
- Energy advice
- Smart (LED) lighting
- Electric vehicles
- Recharging stations

### Value Provided by Accenture

- ASC design and initiation (from pilots to governance)
- Approaching / assembling / organizing all partners
  - Process initiatives from long list to prioritized clusters
- Facilitation of pilot initiation, organization and execution
  - Development of project documents and communication
  - Continuous new concept development, etc.





## Songdo

### Transform how a city is built, managed and experienced

#### Background

- Cisco has launched S+CC (Smart and Connected Communities) to use vertical solutions built on the network as an open integrated platform to change the way communities are designed, built, managed, and renewed
- Cisco's S+CC program targets both emerging and mature markets, especially focused in Asia and expects this to be a \$33B market over 2010-2024
- Songdo , Incheon Free Economic Zone (IFEZ) in Korea is the first such program that Cisco has won, and Cisco is now actively delivering that program (Songdo IFEZ to be a pilot city to be rolled out worldwide)

#### Goal

- Develop a city that would be connected all the time, everywhere and offering Smart services

#### Value Provided by Accenture

- Accenture performed three roles :
  - 1) **Setup Support**
    - Define overall project plan and monitor progress
    - Define short-term business plan
    - Define process / systems requirements
  - 2) **Project Management Support**
    - Check progress of each projects
    - Identify issues and risks
  - 3) **Technical plan support** Define main activities
    - S+CC business technical plan & issue support, demo setups
- **Develop S+CC Service requirements, function & system specifications**

## PlanIT Valley, Portugal A Living Laboratory Smart City

### Background

- With an estimated 65,000 inhabitants at the end of Phase 1, and 130,000 upon completion, the project covers all aspects from physical infrastructure build to social and economic development (including retail, residential, hotels, hospitals, schools and a university)
- The sheer size and scope of a greenfield city development requires sophisticated programme management, alignment of partners and detailed operating model development for each of the business units

### Goal

- Living PlanIT is in the process of setting up its first Research City – PlanIT Valley covering 1,678 hectares in Northern Portugal – which will fundamentally change Portugal’s geography and attract significant foreign investment.

### Value Provided by Accenture

- **Client-side Advisory:** Responsible for helping to define both the holding company structure and business architectures for the Living PlanIT business units. Four key strategy workstreams:
  - Commercialization strategy and financial modelling
  - City master planning
  - Utility strategy
  - Data centre strategy development
- **PMO:** Accenture is taking on a **central coordination role** to help manage the **200+ partners** involved in the project. This includes setting up the appropriate governance and control frameworks to ensure the Living PlanIT portfolio is delivered on budget and on schedule.

## Agenda

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- **Our Point of View on Smart Cities**
- Accenture Capabilities in Smart Cities
- Case Studies

## Fujisawa Sustainable Smart Township

### Background

- Panasonic aims to become the No.1 Eco company globally. In the wake of global intelligent city trend, Panasonic set out to develop a new integrated community in a vacant lot at their former factory site.
- The goal of this project is to integrate Panasonic's advanced technologies and group companies in the construction of a new town.
- Key features:
  - 1) Master plan to provide eco-conscious, comfortable lifestyle and services after the development and sales.
  - 2) Optimally designed infrastructure based on Panasonic's comprehensive solutions.
  - 3) A service model that enables a unique next-generation lifestyle for a smart town.

### Goal

- Development of a new integrated value chain that includes initial master plan development to town operation with sustainable services.
- In order to realize its vision, Panasonic needed to create an operating model and structure for the services provided within the township as well as to find financing for the development.

### Value Provided by Accenture

- Accenture has been engaged in the project for four years, with our proven actions in the world-wide field of building smart cities, and with our network capability as a global partner.
- In the previous phase (Oct 2012~Mar 2013), Accenture helped an establishment of a joint venture for the purpose of acquiring deeper knowledge from partner companies, who have leading positions in urban construction and service operation sectors.
- In addition, Accenture supported Panasonic to get our project financed by METI (Ministry of Economy, Trade and Industry), and to strengthen the network with a local government through PPP (public-private partnership) project.



## Mexico's Ciudad Creativa Digital Innovation in urban regeneration to stimulate the economy

### Background

- Ciudad Creativa Digital was a transformation strategy for a new digital and creative cluster in Guadalajara Mexico
- Led by Mexico's Federal Government with support from state and Municipal governments
- Ambition to consolidate the first Spanish-speaking creative and digital production hubs

### Goal

- Aim at attracting new investments and creation of jobs
- Develop a new sustainable and integrated urban, economic, social and cultural model to foster and drive the local talent towards a knowledge based economy
- Transform Guadalajara's economy, technology industries, educational model and urban footprint.

### Value Provided by Accenture

- Developed the vision and key objectives of the strategy
- Carried out macro-economic impacts study for a creative digital cluster in Guadalajara
  - Carried out in-depth target sector analysis
    - Identification of drivers and opportunities
    - Highlight unique selling points
    - Identification of target partner organizations
    - Develop communication strategy
    - Develop funding approach and principles
- Developed value-added business model
- Produced an innovative governance & operating model

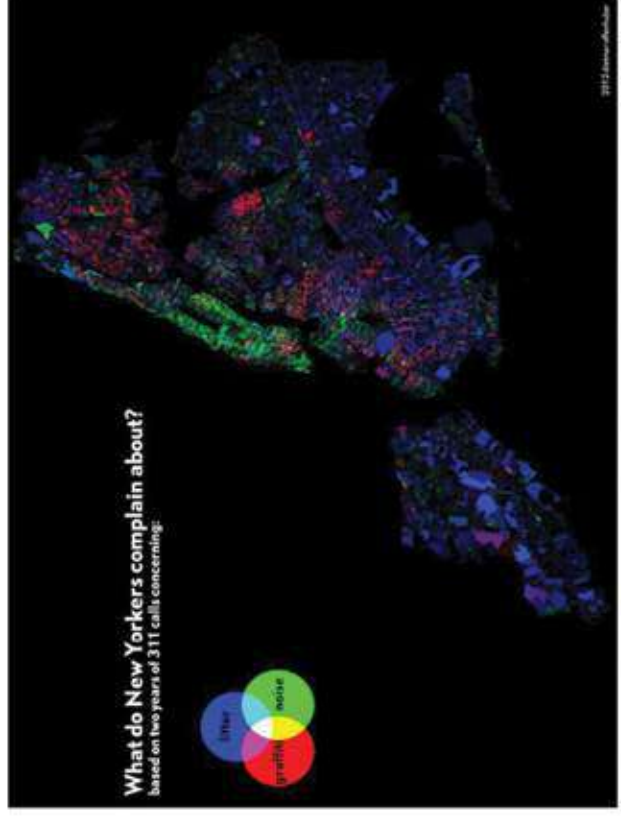
## NYC 311

### Citizen service to allow New Yorkers to reach all City services by calling a single, non-emergency number



Accenture launched NYC311, which was created as a citizen service centre to allow New Yorkers to reach all City services by calling a single, non-emergency number  
Timeframe: Completed 2012

- NYC has a budget exceeding \$60 billion, with over 120 agencies, offices and organisations. There were more than **40 call centres and numerous hotlines run by individual agencies**
- **311 was developed on the assumption that New Yorkers did not know how to navigate the complicated government bureaucracy**, leading to longer wait times, increasing number of calls on the emergency 911 number, and varied customer service
- **Results achieved include:**
  - Improved agency performance
  - Reduced burden on 911 emergency call centre, reversing a 34 year trend
  - Increased citizen confidence in government
  - Increased citizen and community engagement
  - Accelerated transparency and accountability agenda

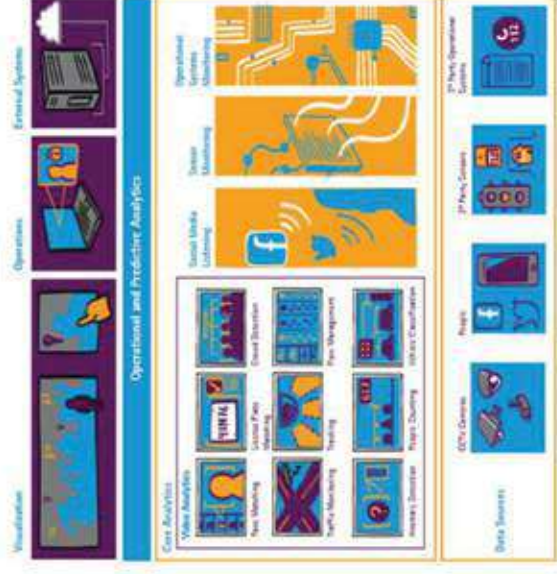
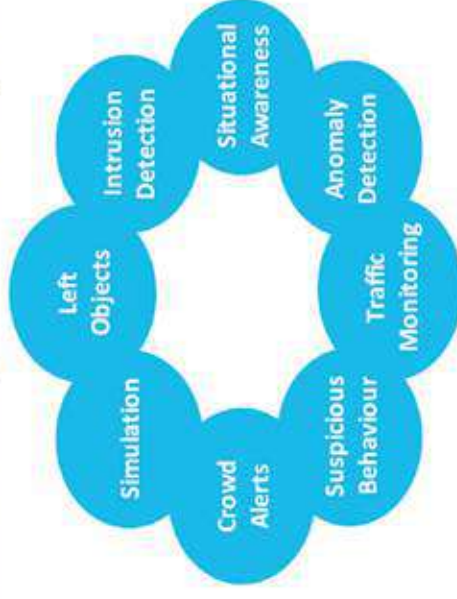




## Singapore Safe City pilot

Accenture were awarded Singapore's Safe City Test Bed pilot, to test advanced technologies and tools to improve public safety and support urban management

- The Safety and Security Industry Programme Office (SSIPO) was jointly established by the Singapore Economic Development Board (SEBD) and the Ministry of Home Affairs (MHA) to **develop a safety and security industry with innovation capabilities in the City of Singapore**
- **Four consortia led by Accenture, AGT International, Cassidian and NEC Asia Pacific** have been selected to participate in the Safe City Test Bed project spearheaded by the SSIPO
- Government agencies and the consortia are working closely to **build and test solutions to enhance the agencies operational capabilities and optimise the use of resources**
- **Results achieved include:**
  - Designed and implemented a platform architecture to improve safety and security by open, scalable and Big Data Analytics
  - Provided valuable insights that will be shared at the World Cities Summit 2014



## Accenture Smart Transportation Case Studies

Non Exhaustive

Name	Description	How Accenture Helped
<b>Netherlands Ov Chipkarrt</b>	Trans Link Systems wanted to provide a single payment method for all means of transport, utilising contactless smart card technology	Accenture 's scope included development of architecture, systems & infrastructure, integration and establishing operations
<b>Danish Travel Card</b>	Wanted to create a single contactless smartcard throughout Denmark covering rail, bus & metro – along with centralised customer information services	Accenture's scope is to design, build, operate and maintain the system & infrastructure
<b>Toronto Presto Card</b>	PRESTO, is a regional automated fare collection system that will establish a single farecard based on contactless smartcard technology that will allow cardholders to access any of the GTA's nine transit service providers providing multiple modes of transit.	Accenture's scope included designing, developing and implementing a seamless fare card system for public transit in Greater Toronto Area
<b>Flexus Card</b>	After Norway had invested into separate smart card schemes, Ruter wished to implement an interoperable smartcard scheme	After the initial launch of Flexus, Accenture provided implementation advice & support across a range of areas such as scheme deployment planning and project management
<b>Smart Ticketing Strategy</b>	FirstGroup needed to define an integrated smart ticketing strategy to all of its UK bus operations	Accenture developed a technology and business roadmap and designed a back-office system that could be accommodated within FirstGroup's wider technology architecture



## Accenture Smart Grid Case Studies

Non Exhaustive

Name	Description	How Accenture Helped
<b>Florida Power and Light</b>	With approximately 4.5 million customer accounts, FPL is undertaking one of the largest Smart Meter rollouts in the US, and they needed to redesign business processes to realize identified business benefits	<ul style="list-style-type: none"> <li>▪ Worked closely with FPL to assess their PMO approach and develop a business process architecture that not only applied an end-to-end process perspective, but also focused on enhancing the end-customer experience</li> <li>▪ Confirmed AMI business case benefits</li> <li>▪ Redesigned more than 50 percent of customer and T&amp;D business processes</li> <li>▪ Defined a robust AMI Business Process Architecture and repository</li> <li>▪ Defined more than 60 additional improvement initiatives</li> </ul>
<b>PECO Energy</b>	PECO launched their Smart Grid and Smart Meter Program in Fall 2009 to comply with Pennsylvania Act 129 mandates and further advance its customer and operational capabilities such as dynamic pricing, web presentation and remote connect/ disconnect.	<ul style="list-style-type: none"> <li>▪ Design and development of the IT solution to support the deployment of 600,000 AMI meters, including: Meter Data Management (MDM) system, Head End system, Asset Device Management (ADM) system, AMI Device Lifecycle Monitoring (ADLM) tool</li> <li>▪ Organizational Design, Communications, Leadership Alignment and Stakeholder Engagement</li> <li>▪ Business Process Design and metrics</li> <li>▪ System and User Acceptance Testing</li> </ul>
<b>Duke Energy</b>	Duke Energy Corp. is one of the largest electric power companies in the United States, which supplies and delivers energy to approximately 3.9 million US customers. A relatively aggressive smart meter deployment effort with associated integration to AMI Head-end and CIS.	<ul style="list-style-type: none"> <li>▪ Capability for TOU rates and pre-pay</li> <li>▪ Demonstrated regulatory compliance</li> <li>▪ AMI dashboard</li> <li>▪ Increased load performance</li> <li>▪ Web presentation capabilities</li> </ul>
<b>Northeast Utilities</b>	Northeast Utilities (NU) wants advance the goals of the Connecticut Electricity and Energy Efficiency Act ("Act") and to fulfill CT Department of Public Utility Control mandates, including lowering Connecticut's peak demand. all cost-effective energy efficiencies as the first-priority resource.	<ul style="list-style-type: none"> <li>▪ Program management, Business process design and employee education. Rate pilot marketing and education</li> <li>▪ Customer enrollment. Customer interaction support. Customer Web self-service</li> <li>▪ AMI metering, including a 1,500 residential AMI procurement</li> <li>▪ Meter data management system and operations</li> <li>▪ Bill calculations</li> <li>▪ "Enabling Technology" (Demand Response) implementation, including procurement and event operations</li> </ul>

## Accenture Smart Building Management Case Studies

Non Exhaustive

Name	Description	How Accenture Helped
<b>Sutter Health</b>	Sutter Health is a non-profit healthcare provider that provides healthcare for more than 100 northern California cities and towns. Sutter Health has 50,000 employees and volunteers and a portfolio of more than 150 facilities.	<ul style="list-style-type: none"> <li>▪ Accenture is deploying Accenture Smart Buildings Solution at over 100 facilities</li> <li>▪ Functionalities included in the solution include fault detection, operational guidelines, and energy dashboards</li> <li>▪ Accenture is responsible for the entire project lifecycle from setting up connection to the buildings to conduction measurement and verification after the Energy Conservation Measures have been identified and executed</li> <li>▪ Run rate savings of the entire portfolio is estimated to exceed \$9.8 million annually</li> <li>▪ 20% reduction in carbon footprint</li> </ul>
<b>Scottish Power</b>	Scottish Power is a vertically integrated energy company, with 9.55m energy customers and 19,489 employees. Their total revenues were €9.3bn in 2012, with net profit of €1.02bn. Scottish Power have a particular interest in energy efficiency, with their renewable energy offering increasing year on year.	<ul style="list-style-type: none"> <li>▪ Connected ASBS to the existing Siemens BMS and other multi-vendor stand alone HVAC components and metering systems (e.g. Daikin, Climaveneta, Trane, Mitsubishi)</li> <li>▪ Provided clear visibility of building energy usage and HVAC equipment function</li> <li>▪ Trained Facilities Management (FM) staff and subcontractors to use the ASBS automated tools for continuous improvement of Maintenance, Repair, and Operations (MRO)</li> <li>▪ Managed subcontractors to conduct programming and maintenance interventions</li> <li>▪ Total energy savings of 19% at the end of year #1 (normalized for weather)</li> <li>▪ Project payback occurred in month #11</li> </ul>



**A Smart City effectively delivers services to citizens and businesses in a an integrated and resource efficient way while enabling innovative collaborations to improve quality of life and grow the local and national economy**

**Overview of an Smart City**



**Efficient services for citizens and businesses**

- Systematic focus on Smart suite of services
- Driven by the needs of human capital
- Meeting needs of citizens and business



**Integrated infrastructure layers**

- Integrated systems (as opposed to “silo” systems)
- Information exchange between infrastructure layers
- Economies of scope and scale across industries



**Innovative collaboration model**

- A collaborative ecosystems of partners
- Innovative sources of financing
- Public-Private innovation

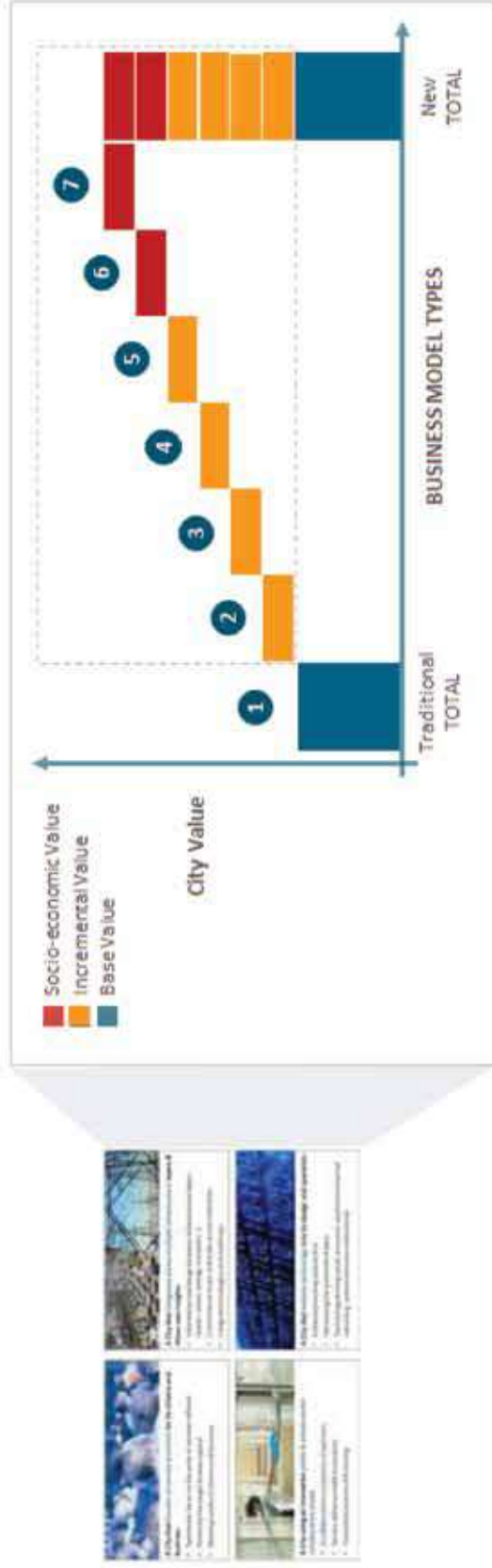


**Technology embedded into design & operation**

- Enhanced sensing and control
- Leveraging digital media effectively
- Harnessing the potential of data

# There are different value creation models through which Smart cities add value for the society

## Value creation models

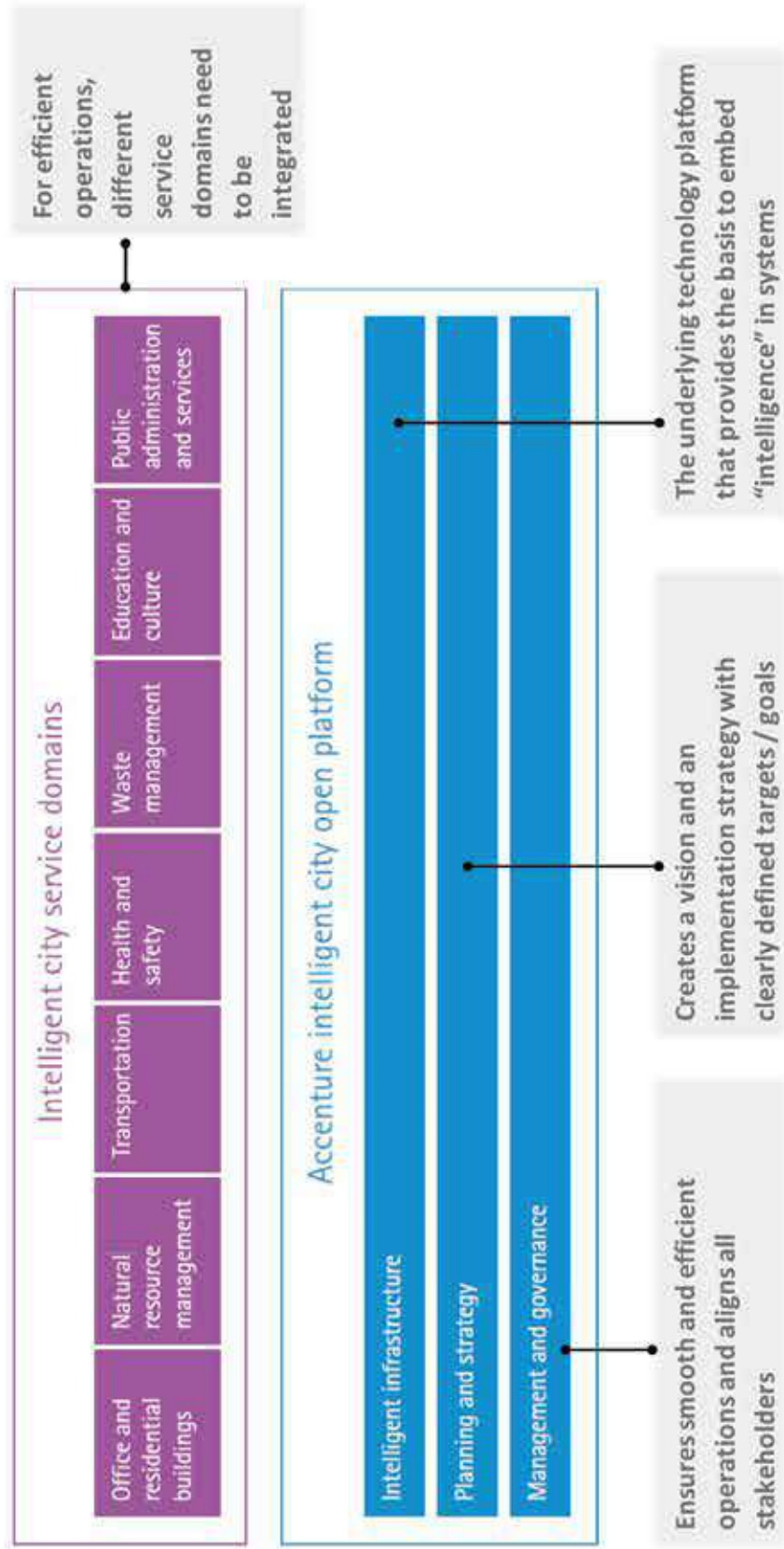


Smart Cities don't evolve by themselves – it requires careful planning!



Such cities would typically have an integrated architecture where in different systems and stakeholders seamlessly communicate / collaborate with each other

### Typical Smart City Architecture

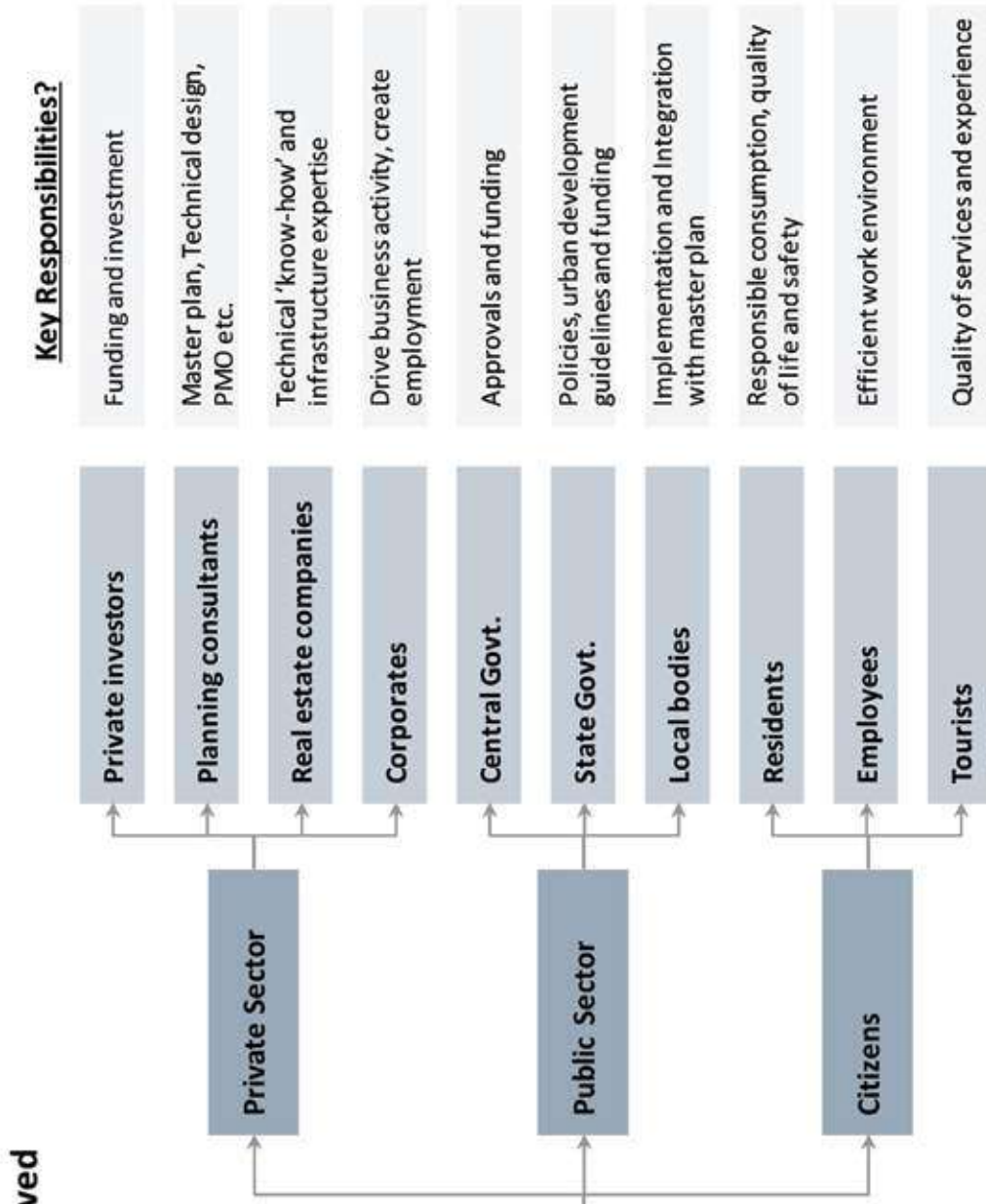


An integrated approach is the most critical success factor for an Smart cluster – silo / piecemeal approach doesn't work!



Moreover, from an implementation perspective different stakeholders need to effectively come together to build an Smart city – it doesn't happen through a standalone technology partner

**Typical stakeholders involved**



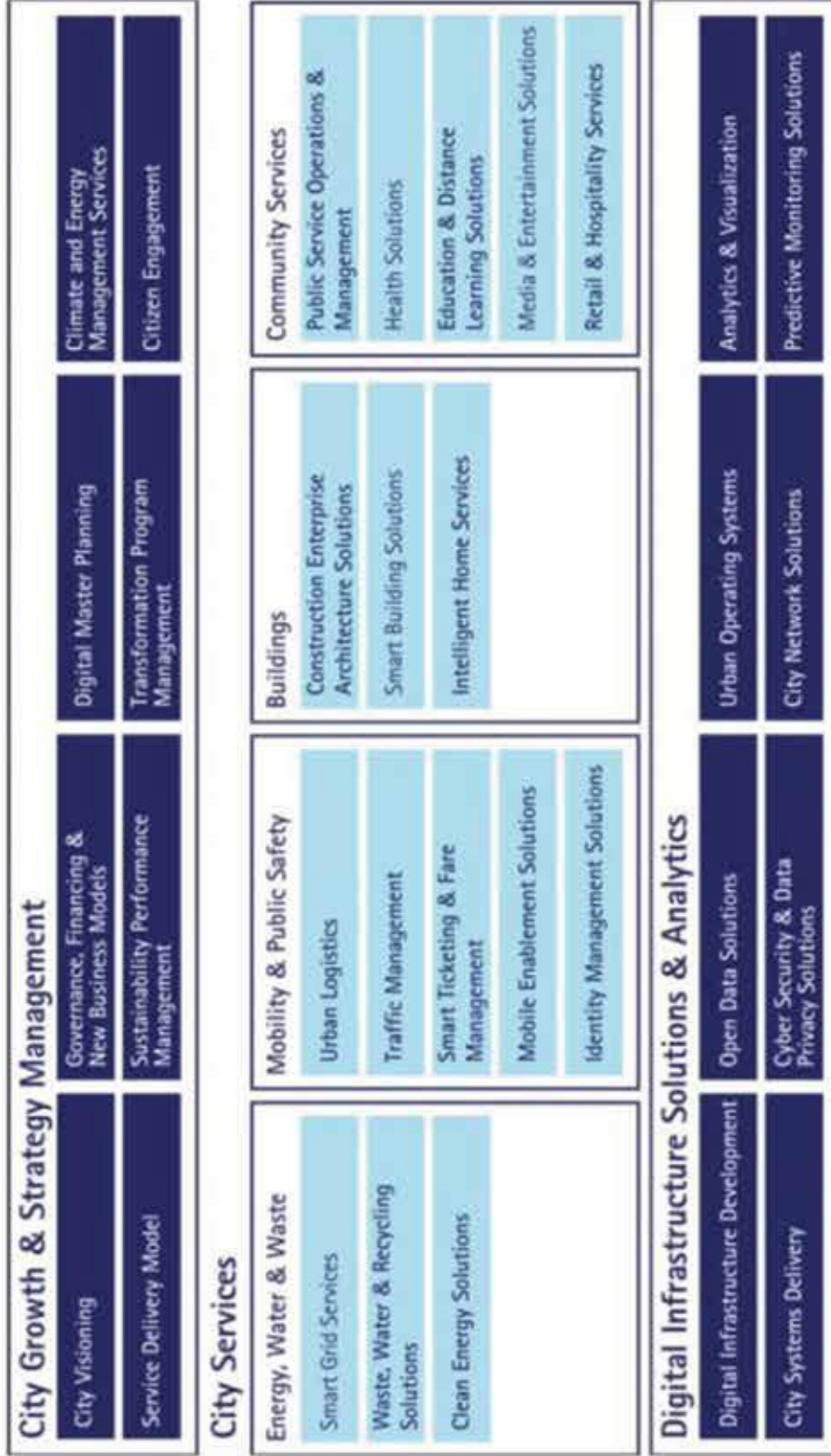
Effectively aligning and engaging different stakeholders is a critical success factor for Smart Cities.

## Agenda

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- Our Point of View on Smart Cities
- **Accenture Capabilities in Smart Cities**
- Case Studies

# Accenture has a breadth of offerings from the strategy to the implementation of Smart Cities





# Smart Cities plays to Accenture’s strengths in transformation through technology

Accenture Capability	Project Example
End to End Solution	KA-CARE, Saudi Arabia
Vendor Agnostic	Amsterdam, Netherlands
Integrated Masterplanning	Kuala Lumpur, Malaysia
Business Model Innovation	Malmö, Sweden
Super Local Super Global	Creative Digital City, Mexico
Value Targeted	Copenhagen, Denmark

Accenture’s proven capabilities across the Smart Cities value chain – with retrofit and new build, from strategy to implementation. Accenture has developed innovative strategic thinking on visioning and value casing, and has proven experience rolling out smart implementations from project management to digital and physical infrastructure .

Accenture’s established strong industry relationships, but is technology and vendor agnostic. Accenture has the freedom to develop fit for purpose solutions for each client, including the creation of open data platforms.

Accenture’s ability to link commercial strategy, service strategy and digital strategy with the physical masterplanning of a city. We work in multidisciplinary teams, with architects and engineers to bridge the gap between the physical and digital aspects or urban planning

Accenture’s focus on the development of new services that attract citizens and businesses, business model innovation and replicable solutions and maximizing the opportunity to generate intellectual property from the city’s design, construction and operations.

Accenture’s ability to team local market knowledge with global subject matter expertise. In addition Accenture’s citizen engagement strategy harnesses local citizen insights during the design processes.

Accenture’s AMC way is focussed on issue to outcome. We help cities to think through their key problems and focus on holistic outcomes – we have the capabilities to communicate value in terms for both public and private sector stakeholders and to help build effective ecosystems of public/private partners.

### Business Description

AECOM is one of the most respected providers of professional, technical and management support service in the world with 100000 employees.

- Our Capabilities include
- a. Architecture
  - b. Building Engineering
  - c. Construction Service
  - d. Design+Planning & Economics
  - e. Energy
  - f. Environment
  - g. Water
  - h. Transportation
  - i. Program Management
  - j. Program, Cost Consultancy
  - k. Oil + gas/Mining

### Business Model

Our purpose is to create, enhance and sustain the world's built, natural and social environment. AECOM India has yet to venture in India as equity partners on infrastructure / real estate project but are looking forward to venture in this field in near future

### Proposition for Infrastructure projects/Smart Cities

Product	
Services	Program Management / Master planning/ EIA / Detail Design/Financial and Economic Analysis/ Infrastructure planning and design

Solutions	Integrated Approach from Feasibility to implementation of Smart City
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### Key Infrastructure Clients

DMICDC, L&T, DMRC, HCC, GMR/GVK

Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid								
System Integration for Large projects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Functional and Technical Architecture for large projects			✓					✓	✓	✓	
Consulting programs and project management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Social Inclusiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Governance & Delivery Programs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Data Analytics & Financial Services				✓				✓	✓	✓	
Technology											

### Proven experience / case study

**International:** London Olympics & Rio site master Planning, Saadiyat Island masterplan, Dubai 2020 Master Plan  
**Hongkong New Townships, India:** Global City Gurgaon, Hyderabad Aetropolis, New Chandigarh master Plan  
 Dholera Special investment region, Exhibition cum convention center Dwarka, Wave City Center

### Key Financials

Turnover US \$ 20 Billion

Proposed Investments



# ALTAIR ENGINEERING INC



**Business Description**  
We are focused on the development and broad application of simulation and technology to synthesize and optimise designs, processes and decisions for our clients for improved business performance.

**Business Model**  
Direct engagement with end user customers through 100% subsidiary operating in India.

**Proposition for Infrastructure projects/Smart Cities**

**Product**  
Altair HyperWorks Suite, Analytics solutions and engineering consulting

**Services**  
Product development using simulation technology, advanced engineering software and high-performance computing (HPC) technologies.

**Solutions**  
Disaster resistant structures, user friendly appliances, green transport solutions, energy efficient buildings through optimal use of computational fluid dynamics etc..

Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid								
System Integration for Large projects			✓	✓			✓				
Functional and Technical Architecture for large projects			✓	✓							
Consulting programs and project management		✓	✓	✓			✓				
Social Inclusiveness			✓	✓							
Governance & Delivery Programs			✓	✓							
Data Analytics & Financial Services	✓	✓	✓	✓			✓				
Technology											

Key Infrastructure Clients		Proven experience / case study		Key Financials	
U.S. Dept of Energy Detroit Department of Transportation Bombardier Transportation Nippon Sharayo Ltd Staddler rail - alstom		Case Studies attached 1. Staddler Rail, 2. Bus Solutions, 3. Reproducible Class Room 4. Bombardier, 5. Nippon Sharyo		Turnover	\$280 m
				Proposed Investments	To be discussed

## Altair HyperWorks Success Story



**STADLER**  
We Track Clever Solutions

## The Altair HyperWorks Suite Speeds Development of Lightweight Alpine Trains

*Stadler Rail is a dynamic company in a dynamic industry. With 2,000 employees at six European locations, Stadler produces light rapid-transit trains and streetcars for regional and local railroads, and is the leading supplier of cars to the cog railway market. The company uses modular, scalable concepts to design customer-oriented solutions, targeting specific needs. The Static/Dynamic/Certification Department, which creates CAE simulations of Stadler's CAD railcar models, used Altair's HyperWorks Engineering Framework to develop the Glacier Express, a lightweight train that carries passengers over a breathtaking route through the majestic Alps. HyperWorks tools enabled the department to move quickly and efficiently through the development process.*

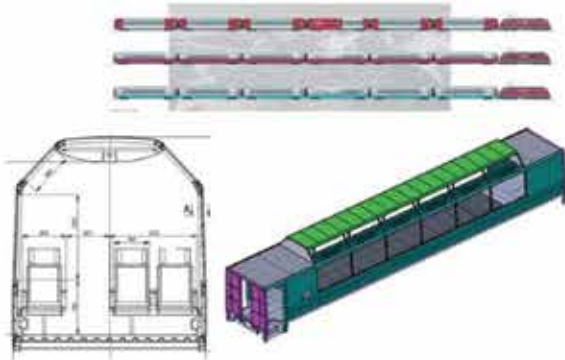


**Altair Engineering**

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## Designing for the Heights

The Glacier Express of Switzerland's Rhätische Bahnen Rail Company rides the Swiss Luxury track between Zermatt and St. Moritz. It carries passengers across bridges, through tunnels and over mountain passes, including the 6,669-foot (2,033 meter) Oberalp pass. For this winding climb, the rail company needed six cars of lightweight aluminum construction with a total weight of no more than 135 tons. Stadler used HyperWorks tools, including HyperMesh and OptiStruct, to meet these requirements, while holding to a tight development schedule.



"The weight restriction for this project was very critical," said Dr. Alois Starlinger, head of Stadler's Static/Dynamic/Certification Department. "We went through many design iterations."

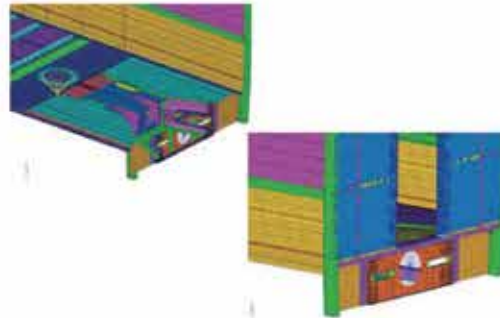
Construction engineers created the first models of Glacier Express railcars in CATIA V. Starlinger's group used HyperWorks to mesh the models and to analyze and optimize system behavior.

"HyperWorks fulfilled all our expectations," said Starlinger. "We were able to read input files directly into ABAQUS, our finite-element (FE) solver, without having to do any edits. HyperWorks enabled us to optimize the design quickly and reach the target weight."

## Close Correlation Between Simulation and Reality

Because of increasingly tight development cycles, prototypes are uncommon in today's railway industry. Trains are built directly from optimized models and do not undergo trials before delivery.

"This makes the reliability of our simulations extremely important," said Starlinger. "We must be able to rely on simulation results 100 percent to avoid unnecessary modifications to the model."



*HyperMesh is highly flexible and easy to handle for creating FE models from CAD geometry taken from CATIA V and other applications.*

Compression tests for train accreditation demonstrated the reliability of the HyperWorks simulations. Railcars were subjected to specific clutch and side absorber pressures. The test series showed very close correlation between simulation results and real-world testing.

"We reviewed many comparative analyses and found the results of the simulations to be absolutely reliable," said Starlinger. "I expect compression tests for metal-only railcar construction to eventually become obsolete. They will be replaced by the kind of simulations we are using now."



*"We like HyperWorks' open platform structure because we don't have to confine ourselves to a single FE solver to use with this tool suite."*

Dr. Alois Starlinger  
Stadler Rail, Switzerland

## Transforming Construction Methods

Simulation is also changing component development at Stadler, enabling the company to create entirely new evaluation methods. In the case of the Glacier





Express, glass windows and the composite-sandwich roof over the entrance are literally glued to the train body.

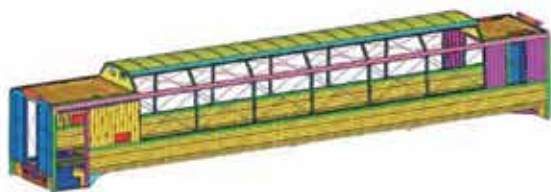
"Using simulation, we were able to define the ideal glue joint and optimize production," said Starlinger. "Tests required for the glued joints were completed on time prior to accreditation. Working with the glue supplier, we were able to optimize application guidelines for structurally glued joints and have them accredited for production."

Simulation also enables construction methods that would be impossible to achieve or would present too much risk, if conventional development methods were used. Some construction steps can now be replaced by simulation, reducing project development risks.

## Fast, Reliable Results

Before Stadler added Altair computer-aided engineering (CAE) software to its development process, the company outsourced simulations to engineering companies that used a variety of software tools. Stadler based development on reports and plots from these contractors. In 2003, Stadler's enormous growth and a desire to minimize development risks moved the company to establish an in-house simulation department. From its inception, the department used Altair software. Starlinger is particularly pleased with the pre- and post-processing capabilities of HyperMesh, HyperWorks' FE modeler.

"HyperMesh makes us very flexible," said Starlinger. "We can convert CATIA V computer-aided design (CAD) models into FE models very efficiently. Moreover, HyperWorks enables us to calculate and analyze large models very quickly."



"The reliability of the software is very important to us. We run the HyperWorks suite on PC workstations using Windows XP and Windows 2000, building models with up to 3.5 millions degrees of freedom and 700,000 elements with no problems. We use HyperWorks for pre- and post-processing on a PC with 2GB of memory and a 3.4GHz processor, and calculation of the models is amazingly fast."

## Altair Support: A Key Advantage

Altair's focus on customer satisfaction was an important factor in Stadler's choice of the HyperWorks suite.

"From our first contact with Altair people, I realized that they had a great deal to offer in terms of knowledge and experience," said Starlinger. "We found them very responsive to our requests. Altair also invested a month's work to develop the special features we requested. That's how I have always imagined a good relationship between software customer and provider would be."



"I picked up a lot of simulation know-how during my career, and I've worked with a number of CAE tools. We evaluated many products before deciding to use HyperWorks. We chose it as our engineering framework not only because it's a perfect match for our needs but also because it includes optimization software."

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*"We chose HyperWorks as our engineering framework because it's not only a perfect match for our needs but also includes optimization software."*

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## The Future: Expanding the Use of HyperWorks

The use of CAE is expanding rapidly at Stadler. During the past three years, Starlinger's department has grown to eight employees and six licenses.

"Our order situation is good, and I expect further growth in the future," said Starlinger. "We already have development orders for the next two years that will require additional manpower and more HyperWorks licenses. We're planning to increase our use of HyperWorks modules, such as OptiStruct, which we will be using for numerical optimization."

As Stadler continues on a strong growth curve, HyperWorks tools will continue to contribute to reduced costs, shorter development cycles, and the high quality for which the company is known.

**Using HyperWorks, Stadler was able to reduce the time spent on individual iterations, cutting calculation time by 20 percent and significantly shortening total development time.**





## Developing the World's First Series Hydraulic Hybrid Bus through Simulation Driven Design



### Key Highlights

#### Industry

Automotive

#### Challenge

Develop a new innovative, fuel efficient bus platform

#### Altair Solution

World's first series hydraulic hybrid bus developed with a focus on minimizing weight to maximize fuel economy

#### Benefits

- 30% improved fuel efficiency
- 30% lower cost of ownership

The Federal Transit Administration (FTA) requires modern transit bus systems to provide more efficient services across America. Currently, U.S. public transit authorities are subsidized to meet operating budgets, with state and local subsidies exceeding \$19 billion per year and federal subsidies exceeding \$7 billion annually. Increasingly high fuel costs, coupled with emission legislation, have led transit authorities to look for vehicles that minimize fuel consumption and lower operating costs. The BUSolutions project is a public-private advanced transit-bus development initiative by Altair that aims to address these needs.

The inspiration behind Altair's BUSolutions program initiative was driven by its

global product development consulting organization, Altair ProductDesign. Through a consulting practice in the transportation industry, it became clear that the business challenges faced by owners and operators required an entirely new bus-development process and design.

Comprising senior management, designers, simulation experts and vehicle development engineers, BUSolutions was launched by Altair as an internally sponsored program. The cross-functional team members sought to apply their deep domain knowledge and a simulation-driven design methodology to fully develop a fuel-efficient, next-generation bus design.

From its inception, the BUSolutions program

***“We would not have exceeded the goals we had set for ourselves had we not applied our knowledge and unique technologies to produce this revolutionary bus. BUSolutions demonstrates Altair’s expertise and capabilities as a concept-to-release, full vehicle development partner.”***

**Mike Heskitt, Chief Operating Officer, Altair ProductDesign**

has continually involved industry experts from the manufacturing segment, transit authorities and rider advocacy groups to ensure that the program goals align with industry needs. Based on the merits of an innovative design and predicted performance benefits, in 2005 Altair partnered with Automation Alley, Michigan’s largest technology business association, to explore government grant opportunities to support the physical build and testing of a technology demonstrator to validate the design.

The program attracted the attention of officials from the U.S. Department of Transportation (DOT) and its Federal Transit Administration (FTA). Since 2005, the FTA has provided funding support to

Altair, with additional program support from the Michigan Economic Development Corporation (MEDC) and Automation Alley to produce a prototype bus demonstrator.

**Solution: Simulation-Driven Design**

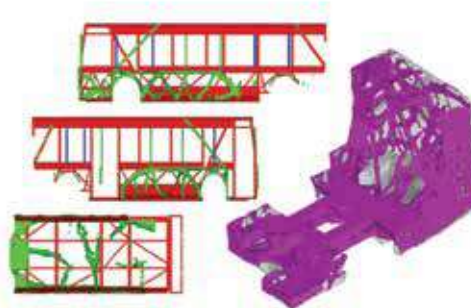
Throughout the development process, vehicle weight was a focus due to its impact on fuel efficiency. When developing the bus, Altair ProductDesign implemented its simulation-driven design process, in which advanced computer-aided engineering (CAE) and simulation technologies are employed at the very start of the design process. Optimization techniques were used to rapidly explore multiple design variations and suggest the ideal layout of structural material. This process gave invaluable

insight to the engineers, who used the initial analysis results to form a weight and performance optimized structure very early in the design process.

The core design synthesis tool for the project was OptiStruct, the Altair HyperWorks finite-element-based technology that helps engineers rapidly develop lightweight, structurally efficient designs. Combining Altair ProductDesign’s engineering knowledge with the OptiStruct tool allowed engineers to generate an innovative, lightweight aluminum frame for the bus.

The drive for minimizing weight went far beyond the aluminum frame, incorporating thin profile seats and composite stanchions

***Utilizing a Simulation-Driven Design approach to product development allowed Altair ProductDesign to develop a bus frame that is 30% lighter than conventional vehicles.***



*Topology Optimization Studies to Find the Ideal Material Layout*



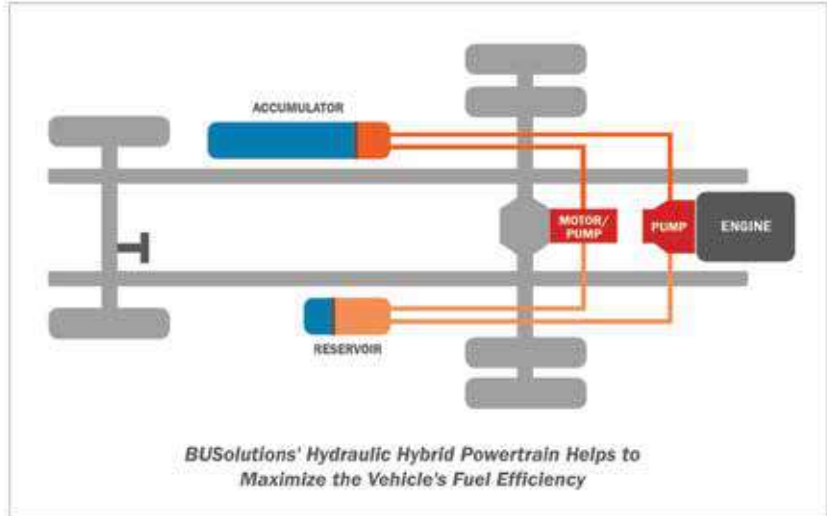
*Photograph of the Optimized Bus Frame*





### About Altair ProductDesign

Altair ProductDesign is a product engineering and development company staffed by a team of 500+ people from over 40 offices worldwide. Altair has pioneered a Simulation-Driven Design approach which leads to design solutions that exhibit minimum weight and outstanding performance.



installed along with balsa-core laminate floor/roof material and lightweight tires, to name just a few of the design considerations.

### Series Hydraulic Hybrid Technology

To maximize the fuel economy of the bus, an efficient powertrain system was required. After reviewing the potential systems, from pure electric drive to more traditional diesel engines, Altair chose a hydraulic hybrid system, the first of its kind in a bus platform. Unlike electric hybrid technology, the LCO-140H bus (Low Cost of Ownership—1st 40-foot Hybrid) uses hydraulic pressure instead of electricity to propel the vehicle. Through combination hydraulic pump/motor units, it captures braking energy to pressurize fluid, which is then re-used to accelerate the bus. The engine runs only on demand and has periods when it is off and the bus relies solely on the stored hydraulic pressure for propulsion.

### Maximizing Miles Per Gallon

Compared to the database of buses tested at Altoona, Penn., where the FTA certification program is run, the LCO-140H

was determined to be more than twice as fuel-efficient as the average conventional bus – delivering 110 percent more miles per gallon. Compared to today's best diesel-electric hybrid bus, the LCO-140H offers 30 percent better mileage and 30 percent lower cost of ownership. This lower cost also comes with higher-level features to meet today's demands for clean technology and simplified maintenance. These include:

- A design that is 15 percent lighter than other hybrid buses and 10 percent lighter than a conventional diesel bus
- Better cost and performance than diesel and electric hybrid buses
- Industry-leading 41 passenger seats, which are 70 percent lighter than conventional systems
- Innovative cooling system with a 50 percent larger surface area and air drawn from the top of the bus through Altair's "clean air corridor" design
- Reduced accessory power draw
- Durable LED interior lighting
- Ergonomically tailored driver's environment with increased visibility
- Disc brakes on all wheels

### Conclusion: Twice the Fuel Efficiency at a Lower Cost

What started as an internally funded "stretch" project, today has resulted in an industry-first, series hydraulic hybrid bus design that is ready for manufacture. Having successfully completed the testing phase to validate its design and performance metrics, the BUSolutions LCO-140H is the lowest-cost, most fuel-efficient hybrid bus designed to date.

Based on a "clean-sheet" design approach, the extremely lightweight bus design yields more than twice the fuel efficiency of conventional buses and is projected to save \$25,000 per year per vehicle for transit authorities using the platform. Requiring no infrastructure upgrades to operate, the LCO-140H is an attractive option for transit authorities to cost-effectively upgrade aging fleets with hybrid vehicle technology.

Find out more about BUSolutions at: [www.altairbusolutions.com](http://www.altairbusolutions.com)

Find out more about Altair ProductDesign at: [www.altairproductdesign.com](http://www.altairproductdesign.com)

Visit the Altair ProductDesign library of  
**Success Stories**  
at [www.altairproductdesign.com](http://www.altairproductdesign.com)

## About Altair

Altair empowers client innovation and decision-making through technology that optimizes the analysis, management and visualization of business and engineering information. Privately held with more than 1,800 employees, Altair has offices throughout North America, South America, Europe and Asia/Pacific. With a 25-year-plus track record for innovative product design and development, advanced engineering software and grid computing technologies, Altair has more than 3,500 corporate clients representing the automotive, aerospace, government and defense, and consumer products verticals. Altair also has a growing client presence in the life sciences, financial services and energy markets.



Altair ProductDesign is a global, multi-disciplinary product development consultancy of more than 700 designers, engineers, scientists, and creative thinkers. As a wholly owned subsidiary of Altair Engineering Inc., this organization is best known for its market leadership in combining its engineering expertise with computer aided engineering (CAE) technology to deliver innovation and automate processes. Altair ProductDesign firmly advocates a user-centered, team-based design approach, and utilizes proprietary simulation and optimization technologies (such as Altair HyperWorks) to help clients bring innovative, profitable products to market on a tighter, more efficient time-scale.

[www.altairproductdesign.com](http://www.altairproductdesign.com)



HyperWorks is an enterprise simulation solution for rapid design exploration and decision-making. As one of the most comprehensive, open-architecture CAE solutions in the industry, HyperWorks includes best-in-class modeling, analysis, visualization and data management solutions for linear, nonlinear, structural optimization, fluid-structure interaction, and multi-body dynamics applications.

[www.altairhyperworks.com](http://www.altairhyperworks.com)



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Altair®, HyperWorks®, RADIOSS™, HyperMesh®, BatchMesher™, HyperView®, HyperCrash™, HyperGraph®, HyperGraph™3D, HyperView Player®, OptiStruct®, HyperStudy®, HyperStudy®DSS, MotionView®, MotionSolve™, Altair Data Manager™, HyperWorks Process Manager™, HyperForm®, HyperXtrude®, GridWorks™, PDS Professional®, and e-Compute™ are trademarks of Altair Engineering, Inc. All other trademarks or servicemarks are the property of their respective owners.



Visit the Altair library of  
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[www.altairproductdesign.com](http://www.altairproductdesign.com)

## About HyperWorks

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# APPLIED MATERIALS INDIA PVT. LTD.



Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid								
System Integration for Large projects											
Functional and Technical Architecture for large projects											
Consulting programs and project management											
Technology development	✓	✓	✓								
Engineering design	✓	✓	✓								
Social Inclusiveness											
Governance & Delivery Programs											
Data Analytics & Financial Services	✓	✓	✓								
Technology											

**Business Description**  
 Applied Materials Inc. is the global leader in providing innovative equipment, services and software to enable the manufacture of advanced semiconductor, flat panel display and solar photovoltaic products. Our technologies help make innovations like smartphones, flat screen TVs and solar panels more affordable and accessible to consumers and businesses around the world.

**Business Model**  
 Applied Materials is a strategic partner and an enabler of the semiconductor, power, lighting and display ecosystems in India. The India entity, which began its operations in 2002, is today the second largest engineering resource pool for Applied globally. Applied India provides engineering design and support services as well as cutting edge innovation in the development of new products and solutions globally through its strong partnership ecosystem. Applied Materials collaboration with IIT-Bombay laid the foundation for building a semiconductor manufacturing ecosystem in India. Applied, in association with IIT Bombay, established the Applied Materials India Semiconductor Education Center (AMISEC) at the IIT Bombay campus. Applied also has a 200mm semiconductor fabrication facility dedicated to industry-university research and the Applied Materials Chemistry Laboratory for Energy & Nanoelectronics (CLEAN) at the IIT B campus. Together with IIT Bombay, Applied Materials also introduced the Applied Materials India Semiconductor Manufacturing Technology for the first time in India. Applied Materials is looking at several growth markets that leverage our strength in Precision Materials Engineering. Some examples are: IoT, 3D printing, Energy harvesting, Storage Solutions, Power, Web coatings etc.

**Proposition for Infrastructure projects/Smart Cities**  
**Product**  
 Fault current limiters for transmission, distribution and microgrids to improve voltage stability and power reliability  
 Advanced Material Development, R&D for Sensors & MEMS to enable IoT Energy Harvesting to enable wireless sensors in smart cities  
 Data Analytics to support energy management  
 Energy storage solutions that enable smart cities

**Services**  
 Applied is the largest provider of services to enable high utilization and efficiency of semiconductor, solar, display factories and energy utilities.

**Solutions**  
 NA

**Key Infrastructure Clients**  
 NA

Key Financials	
Turnover	\$9.1B
Proposed Investments	TBD

**Proven experience / case study**  
<http://www.appliedmaterials.com/company/news/press-releases/2014/04/applied-materials-receives-intels-preferred-quality-supplier-award>  
<http://www.appliedmaterials.com/company/about/awards>



# DELIVERING IMPEDANCE ON DEMAND™ TO PROTECT POWER NETWORKS

## Fault Current Limiters

Around the world, as the demand for electricity increases, utilities are adding capacity by increasing generation. This additional generation is also becoming more decentralized with the incorporation of co-generators, independent power producers and alternative energy sources such as wind and solar.

The capacity and the interconnectedness of the grid are necessities, to provide the redundancy and improved reliability required by consumers. As the energy requirement of the customer base increases, more generation is added and the fault current levels in the existing grid rise dramatically, compromising infrastructure and threatening catastrophic outages.

Increasing grid interconnectedness, so necessary in delivering reliability, reduces impedance and causes high fault currents that exceed the ratings of much of the costly infrastructure in service today. According to EPRI, "Under increased power flow conditions on existing assets, managing fault currents is crucial in order to avoid malfunctioning and damage of equipment as well as to increase system reliability."

## AND THE PROBLEM IS JUST GETTING BIGGER.

### India Contact

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## AN INNOVATIVE SOLUTION FOR MANAGING FAULT CURRENTS

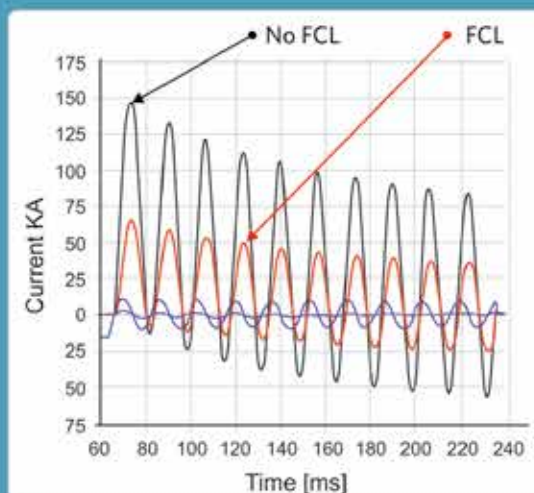
Utilities require a solution for managing fault currents that offers minimal impedance (under normal operation), significantly reduces the first peak in the fault current and is cost effective. Applied Materials Fault Current Limiters (FCLs) are the only proven technology that delivers these features in a compact footprint. Our FCLs enable grid security and reliability, offering the most viable, long-term solution to the mounting fault current problem.

## PRODUCT OFFERINGS

Applied's Fault current limiters use state-of-the-art technology and modular design approach. Device level modularity ensures the products are easily configurable. Applied Materials has two products addressing two segments of the grid market:

- Superconducting FCL (SCFCL) using superconductors for high voltages from 11KV to 400KV
- Solid State FCL (SSFCL) using solid state electronics for voltages from 6KV to 45KV

The FCLs work with normal currents ~3500 Amps and are capable of handling faults exceeding 100KA. The SSFCLs are also voltage dependent.



## COMPACT FOOTPRINT

The physical dimensions of our distribution class FCLs offer the smallest footprint possible. At 1.2m wide x 2.4m long x 2.5m high, they can be easily retrofitted into existing substations.

Our transmission class FCL has a footprint as small as 1.8m per phase. The footprint can be customized to meet the particular need of the customer.

## RELIABILITY AND SECURITY

Applied Materials FCLs have been designed with the key requirement of maximizing utility power system reliability. A common platform approach ensures reliability and easy scalability of the products and simplifies testing. They require no outside control system to operate and thus are immune to control system failure or cyber-attack.

The FCLs are designed for a long life span of 40 years and 15 years for SCFCL and SSFCL respectively.

## COST EFFECTIVE

- Avoid or defer capital investment in equipment upgrades
- Increase utilization of existing assets
- Protect both equipment and people by ensuring faults do not exceed equipment ratings
- Eliminate disruptions to circuits and critical infrastructure







Parameter	<b>TRANSMISSION CLASS</b> Super conducting FCL for 11KV to 400KV	<b>DISTRIBUTION CLASS</b> Solid State FCL for 6KV to 45KV
Line Voltage	11KV to 400KV Line to Line	6KV to 45KV Line to Line
Line current	Up to around 3.5KA	Up to around 3.5KA
Line Frequency	50/60 Hz	50/60 Hz
Fault current reduction	Up to 60% First peak and RMS	Up to 60% First peak and RMS
Normal (unfaulted) voltage drop	None. Negligible insertion impedance	None. Negligible insertion impedance
Insertion impedance if loss of control system	None. Negligible insertion impedance	None. Negligible insertion impedance
Fault duration	Designed to utility specifications	Designed to utility specifications
Fault sequence	Multiple faults per event compatible with the automated utility reclosure schemes	Multiple faults per event compatible with the automated utility reclosure schemes
# of operations	Unlimited over the lifetime	Unlimited over the lifetime
Recovery time	Designed to the requirement as specified by the utilities	Designed to the requirement as specified by the utilities
FCL operation time w/loss of power	A few days. No electronics required for operation	UPS required
Maintenance interval	Annual maintenance of refrigeration units	Annual maintenance
Service life	> 40 years	> 15 years
Typical Dimensions	1.8m L X 1.2 m W per phase. Systems configured to sub-station needs.	2.4m L x 1.2m W x 2.5m H. Exact size determined by MVA and current Limiting specs
Fault Current	10KA to 100KA Prospective unlimited fault current	

\* Specifications are subject to change.

## GLOBAL TECHNOLOGY LEADERSHIP WITH A STRONG INDIA PRESENCE

### Applied Materials Inc.

Fiscal 2013 Revenue	\$7.5 Billion
Fiscal 2013 R&D	\$1.3 Billion
Headquarters	Santa Clara, California
Global Presence	84 locations in 18 countries
RD&E and/or Manufacturing Centers	China, Germany, India, Israel, Italy, Singapore, Taiwan, United States
Employees	-13,700 worldwide
Patents	-10,400 issued

Data as of fiscal year end October 27, 2013.  
\* Headcount excludes temporary and interns

### Applied Materials India Pvt. Ltd.

Founded	July 2002
Headquarters	Bangalore, India
India Presence	Bangalore, Chennai, Delhi, Mumbai
Global Presence	84 locations in 18 countries
Lab Space	25,600 sq. ft.
University Spend	> 70 Crores
Employees *	-2,300 employees

\* Including RTFs, Contractors and Associates



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Business Description	Core Competencies	Energy			Smart Transportation	Telecom	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
		Power	Renewables Generation	Smart Grid									
Business Model	System Integration for Large projects		✓	✓		✓		✓	✓		✓	✓	
	Functional and Technical Architecture for large projects		✓	✓	✓	✓		✓	✓		✓	✓	
Proposition for Infrastructure projects/Smart Cities	Consulting programs and project management		✓	✓	✓	✓		✓	✓		✓	✓	
	Social Inclusiveness												
	Governance & Delivery Programs			✓	✓	✓		✓	✓				
Key Infrastructure Clients	Data Analytics & Financial Services												
	Design and manufacture of critical motion control components												
	Sub system Integration capability												

Proven experience / case study		Key Financials	
Navi Mumbai City Surveillance Solution, BC Hydro Canada- with ITRON.- AMI, National Grid- FAN/AMI, Deutsche BEHN (German Railways)- In train Surveillance, Dubai Metro- Trackside WIFI, Reliance GIO, Vodafone, BSNL- Telecom, Waste Management- Barcelona City		Turnover	Proposed Investments

# DATA CARD

B-302, Flexcel Park, S. V. Road, Next to 24 Karat Multiplex  
Jogeshwari (West), Mumbai - 400102



Core Competencies	Energy		Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management
	Power	Renewables Generation							
System Integration for Large projects			✓		✓				
Functional and Technical Architecture for large projects			✓		✓				
Consulting programs and project management			✓		✓				
Social Inclusiveness									
Governance & Delivery Programs					✓				
Data Analytics & Financial Services									

**Business Description**  
Datacard Group offers technologies for securing identities and safeguarding transactions in physical and digital environments. The company's innovative portfolio now includes Entrust® authentication software platforms, bringing important new capabilities to tens of thousands of government agencies, financial institutions and other enterprises in more than 150 countries. Together, Datacard Group and Entrust issue more than 10 million secure identities every day, manage billions of secure transactions annually and issue a majority of the world's financial cards.

**Business Model**  
Secured and personalised card issuance through central issuance, instant issuance and mobile issuance infrastructure.

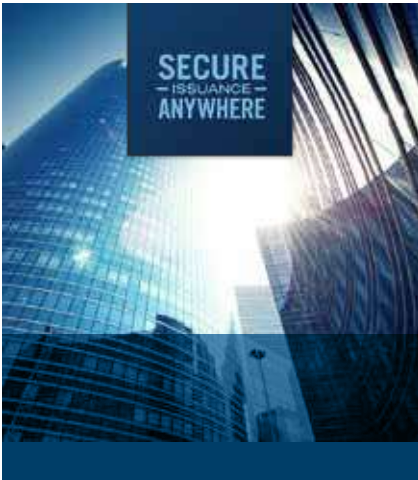
**Proposition for Infrastructure projects/Smart Cities**  
Product  
Services  
Solutions  
Providing secured access to citizens in smart cities through robust and innovative card issuance solution

**Key Infrastructure Clients**  
Govt of India, National ID Program  
Delhi Driving License Program  
Top Banks Globally  
Thousands of clients across the world

**Proven experience / case study**

Key Financials	
Turnover	\$ 650 Mn
Proposed Investments	Already invested in India thru a subsidiary of Datacard Corporation, USA





**DATACARD GROUP**

- Privately Held
- Headquartered in Minnesota, USA
- Founded in 1969
- 2,000+ employees in 34 worldwide locations
- Sales and service covering 150+ countries
- Systems used to issue the majority of the world's financial cards
- 10M+ identities issued daily
- Billions of transactions managed annually
- 30,000+ instant issuance solutions deployed
- 425+ patents owned
- 300+ engineers

**CONNECT WITH US EVERYWHERE**



[www.datacard.com](http://www.datacard.com)  
[info@datacard.com](mailto:info@datacard.com)  
 +1 952 933 1223

**Trusted Identities & Secure Transactions**

Each of us is a consumer and a citizen. At different times, we're also employees, students, patients and members. In these roles, we conduct transactions, use information, enter facilities, cross borders and access government services. Datacard Group brings trust and security to each of those interactions for millions of people every day — across both physical and digital domains.

**Solutions for Issuing & Managing Trusted Identities**

The ability to prove our identity — whether we're crossing a border or buying something online — is core to the way of life in every country and every culture. Datacard Group provides a broad portfolio of solutions for enabling trusted identity. We offer complete solutions for issuing and managing passports, national IDs, employee badges, driver's licenses and other physical credentials. Our Entrust® software authentication platforms provide the essential infrastructure for trusted identification in mobile environments, the cloud and other digital domains.

**Secure Transactions Across All Physical & Digital Domains**

Datacard® solutions have enabled secure transactions for more than 45 years. Our systems and software are used to issue a majority of the world's financial cards. Recent Datacard® and Entrust® innovations in mobile payment and e-commerce bring security and simplicity to digital payment environments. Our technology and expertise has helped us earn trusted relationships with virtually every large financial institution in the world. We work in close collaboration with these customers to strengthen security and reduce complexity in an increasingly connected world.

**Empowering Our Customers to Work However, Wherever They Choose**

The solutions we create for government agencies, financial institutions and other enterprises are highly adaptive. They empower our customers to issue and manage cards, credentials, mobile wallets and digital identities anywhere and anyway they choose — with exceptional security. We call this commitment to customer empowerment *Secure Issuance Anywhere™*. In addition to protecting our customers' investments, our flexible and adaptive solutions allow them to respond quickly to changes in the markets they serve.

**Serving Governments, Financial Institutions & Other Enterprises**

Security-minded enterprises rely on Datacard Group and use our solutions as a foundation for their identity and transaction infrastructures. We work closely with hundreds of financial institutions, including the world's 20 largest banks. Our instant issuance and mobile payment solutions are creating exciting new opportunities for banks, retailers and other consumer marketers. We're engaged in high-profile government identity programs across 150+ countries. We also serve customers in telecommunications, aerospace, pharmaceutical, education, healthcare and petroleum markets.

**Entrust**

**Datacard Group**

# EMD LOCOMOTIVE TECHNOLOGIES PVT. LTD.

301 - 312, Amba Deep, 3rd Floor, Kasturba Gandhi Marg  
New Delhi – 110 001



Business Description	Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
		Power	Renewables Generation	Smart Grid								
OEM-Diesel Electric Locomotives, locomotive parts & components & diesel engines	System Integration for Large projects			✓								
	Functional and Technical Architecture for large projects											
	Consulting programs and project management											
	Social Inclusiveness											
	Governance & Delivery Programs											
	Data Analytics & Financial Services											
	Technology											

**Business Description**  
OEM-Diesel Electric Locomotives, locomotive parts & components & diesel engines

**Business Model**

1. Technology Transfer to Indian Railways
2. Equipment management and maintenance services
3. Integrated and diversified suppliers of railroad and transit system products and services worldwide

**Proposition for Infrastructure projects/Smart Cities**

Product	✓
Services	✓
Solutions	✓

**Key Infrastructure Clients**  
Indian Railways & Railways in many other countries

**Proven experience / case study**

**Key Financials**

Turnover	
Proposed Investments	

# EMD IN INDIA

## 1. Transfer of Technology to DLW for 4000 HP AC AC Locomotives

- In the **mid 1990's** Indian Railways was looking for a **Transfer of Technology** arrangement to produce its own locomotives at the Diesel Locomotive Works (DLW) Varanasi. At a time when no other locomotive manufacturer was willing, EMD came forward and **offered state-of-the-art technology for the 4000 HP AC AC locomotives.**
- EMD transferred state-of-the-art locomotive technology to India in **1995** for the WDG-4, **4000 HP AC/AC locomotive** produced at Diesel Locomotive Works (DLW), Varanasi. Today, **more than 1300 EMD locomotives are operational** in India and the year 2013-14 **saw production of 269 locomotives at DLW, Varanasi.**

## 2. In-house production of 4500 HP IGBT AC traction system based locomotive

**In 2006**, EMD introduced the concept of the highly efficient and reliable IGBT based traction control system, which resulted in the new **4,500 HP IGBT AC traction system based locomotive as the next generation in the family of locomotives** at DLW.

## 3. WDG5 Locomotive

Taking this relationship to a higher level, recently EMD has been part of a collaborative effort with RDSO and DLW to **design & produce the WDG-5 locomotive, a 5500 HP heavy haul diesel locomotive**, which can not only run on the existing tracks but also on the proposed DFC network.

This diesel locomotive is the **most powerful locomotive** to ever run on the Indian rail network. In combination with its record high tractive effort of 560 KN, it can pull more load at higher speeds, thus enabling Indian Railways to increase the system throughput in the rail network. **A very significant feature of WDG5 is its "Crashworthiness", a crucial requirement for safety. It also has "driver facilities" – air conditioned console & toilet, which can greatly enhance safety on the rails.**

## 4. GTO to IGBT Based Traction System Technology

- In the direction of modernization, Indian Railways recently took a pioneering step with the active support of EMD towards upgrading the existing 4000HP GTO based AC-AC Traction system technology to the latest IGBT based AC-AC Traction system technology on EMD design Diesel-Electric Locomotives.
- With this conversion project, Indian Railways has not only gone in for world-class and maintenance friendly technology but has also achieved a higher haulage capacity by increasing the horse power of the locomotive from 4000HP to 4500HP.

# Progress is ...

## Power, Performance, Innovation, Quality.

Progress Rail Services Corporation, a Caterpillar company, is one of the largest integrated and diversified suppliers of railroad and transit system products and services worldwide. Since our acquisition by Caterpillar Inc. in 2006, Progress Rail has used the Caterpillar international footprint to gain quick and widespread notice and approval across the globe. Product technology, reliability and durability, along with legendary aftermarket parts and service support, have been our keys to success. Caterpillar is the world's leading manufacturer of construction and mining equipment, diesel and natural gas engines and industrial gas turbines. The technology and world reach of Caterpillar, combined with the service standard and historical reliability of Progress Rail, ensures our products and services make a growing impact on the world rail industry.

With our acquisition of Electro-Motive Diesel (EMD), Progress Rail is the world's largest builder of diesel-electric locomotives for all commercial railroad applications including freight, intercity passenger, commuter, switching, industrial and mining. EMD is also a global provider of diesel power engines for marine propulsion, offshore and land based oil well drilling rigs and stationary power generation. Electro-Motive is the only diesel engine manufacturer of its size to have produced more than 70,000 engines. This success stems from product reliability, serviceability, load acceptance capability, low operating costs and ease of maintenance with standardized components.

For more than half a century, Electro-Motive locomotives have hauled freight and passengers, powered ships, and generated electricity for over 100 countries around the globe. Our products are built to last and outperform the competition. EMD products have performed in nearly every imaginable condition - from the sands of the Sahara, to the heights of the Andes, to the demanding grades of the Powder River Basin. With that performance, we've not only helped our customers achieve their goals, but we've also earned a reputation for quality, service and innovation.

Progress Rail engages in a lifelong relationship with customers and offers a complete line of value-added services to enhance the performance of our products. The equipment management and maintenance services set industry standards for service excellence. Through technological advancements and customer-focused solutions, our customers achieve new levels of availability, reliability and asset utilization. Listening to and supporting customers, pursuing continuous improvement, and building on a reputation for manufacturing excellence, we look forward to a future of innovation and service to the fast-changing global railroad and power products industries.



[www.progressrail.com](http://www.progressrail.com)



# Making progress possible...

## Rolling Stock



Locomotives



Transit



Freight Car

## Infrastructure



Track



Signals

As railroads throughout the world turn to Progress Rail and Electro-Motive Diesel for a wide variety of needs, we provide an extensive line of reliable services, and as one of the most trusted providers of a wide variety of products to the rail industry, our global footprint continues to evolve.

Progress Rail Services is one of the largest providers of rail and transit products and services in North America. We have become an industry leader by delivering quality materials, providing experienced and reliable service, and offering unprecedented convenience through our network of highly integrated, strategically located facilities.

Through Electro-Motive Diesel, we are the world's premier provider of locomotive technology. Our products, our people, and our worldwide affiliates enable us to lead the industry as we improve productivity and safety standards around the world.

As a wholly owned subsidiary of Caterpillar, we are in a unique position to offer the widest range of products and services possible, including the most fuel efficient, environmentally friendly locomotive engines, to railroads in every area of the world.

The world's resources continue to be stretched, so we are working to help protect the environment and save our customers money by refurbishing or recycling materials and offering more sustainable products.

That's Progress.



With more than 125 operating facilities in countries across the globe, our facilities are strategically located to provide customers with the best products and services to keep their cars and locomotives moving.



[www.progressrail.com](http://www.progressrail.com)

### Business Description

Diversified manufacturing and technology provider with electrical products and solutions in the Automation Solutions and Commercial and Residential Solutions domain.

### Business Model

Business Model: Early Engagement with EPCs of Renewable (Solar, Geothermal, Biomass, Wind/Waste to Energy), Water & Waste Water/Gas Distribution and exploring partnership potential. Smart Solution Architect to enable effective technology integration. City-wide strategy & solution development.

### Proposition for Infrastructure projects/Smart Cities

**Product**  
Plant Controls and Supervisory Control and Data Acquisition for renewable Power Generation, Measurement & control devices Heating, Air-conditioning and refrigeration systems for building, retail and mass transportation. Gas and CNG / LPG regulators. Valves, Actuators & Regulators.

**Services**  
IIoT based Digital Services Consulting & Training. Lifecycle Services

**Solutions**  
Plant Control and Monitoring Systems Intelligent Field Devices Commercial & Residential Solutions Energy Management and Online Plant Modeling Optimization

### Key Infrastructure Clients

Core Competencies	Energy			Smart Transportation	Logistics	Aviation	ICT & IT Enabled Services	Disaster Management	Safety, Surveillance & Critical Infrastr Security	Public Health	Water Treatment	Waste Management
	Power	Renewables Generation	Smart Grid									
System Integration for Large projects	✓	✓					✓		✓		✓	✓
Functional and Technical Architecture for large projects	✓											
Consulting programs and project management	✓											
Social Inclusiveness												
Governance & Delivery Programs				✓								
Data Analytics & Financial Services	✓											

### Proven experience / case study

Turnover

300 Million Dollars

Proposed Investments

500 Million Dollars

### Key Financials

# Power Generation Controls & Application Expertise

## Enhance Your Operational Readiness

Our team of power industry experts work with you to enhance your operational readiness – improving plant availability and flexibility while also enhancing workforce proficiency and productivity.  
<http://www.emerson.com/en-us/automation-solutions>

### Fossil Fuel

Improve availability and better handle cycling

- Steam and Gas Turbine Control
- Boiler Combustion Control
- Generator Excitation Control
- Burner Management
- Air Quality Control Systems
- Balance-of-Plant Control
- Fuel Handling
- Simulation



### Renewable Energy

Harness renewable power to fullest potential

- Wind
- Hydroelectric
- Solar
- Biomass
- Geothermal
- Flywheel



### Nuclear

Maximize performance with stringent safety

- NSSS Controls
- Data Acquisition
- Simulation



### Advance Software Applications

Simulate virtual environments

- Performance & Economic Optimization
- Analytics and Decision Support
- Model-based Control

Our Brands: Rosemount, Ovation, Micro Motion, Fisher, Plantweb



# Case Study: Gurgaon DLF Building – Electrical Control & Monitoring



## Power Equipment

- Building 5 : 5 Gas Engine Generators at 11kV
- Building 10 : 8 DG's: 5 Gas Engine Generators at 11kV
- 2 X 66 KV Utility Grid – normally islanded
- 2X69/11 KV grid tie-transformers
- 1 sub-station (power plant)
- Switchboard Voltages at 11 kV

## Application

- Remote Breaker Control
- Neutral Grounding resistor open /close auto/manual control
- Load-shedding (on-loss of power producer and low frequency)
- Generator MW & MVAR Control in islanded state
- Soft I/O Acquisition

## Key Highlights

- Single Ovation Platform at each Building to control 17 Generators in Building - 10 & 9, Generators in Building - 5
- Successful remote monitoring of building data in Head Office location
- Reliable and efficient

Our Brands: Ovation





# Water Treatment Controls & Application Expertise

## Optimize Energy And Operational Efficiency

Emerson's team of water industry experts can help you achieve operational excellence, minimizing energy use while enhancing equipment reliability and operator effectiveness.  
<http://www.emerson.com/en-us/automation-solutions>

## City-wide SCADA Systems

Manage communications with remote systems

- City-wide management of distributed systems
- Wastewater collection
- Water distribution
- Remote operations
- Sewer diversion
- Water irrigation
- Wet weather overflow protection
- Weather monitoring



Our Brands: Rosemount, Ovation, Micro Motion



## Water and Wastewater Plants

Navigate complex water systems

- Wide-area interceptor monitoring
- Preliminary, primary, secondary & tertiary treatment
- Solids handling
- Phosphorus reduction
- Odor control & disinfection
- Filtration
- Methane recovery
- Composting
- Incineration



# Cold Chain and Food Waste Management Solutions

## Optimize Performance of Commercial and Residential Applications

We offer innovative, reliable solutions to keep business running smoothly. Create comfortable, controllable environments with higher reliability and efficiency.

<http://www.emerson.com/en-us/commercial-residential-solutions>

### Cold Storage Facilities

Reduce energy costs and spoilage while improving safety

- Ensure projects are optimally designed
  - Ripening chambers
  - Pharma cold rooms
- Leverage energy efficient technologies
  - Dairy cold rooms
  - Packhouses
- End-to-end repair and test



### Food Waste Management

Manage waste with innovative disposal products

- Environmental benefits
  - Convert to renewable energy
- Keep trash smells away
  - Cleaner, fresher kitchen
- Redirect waste from landfills

Our Brands: Vilter, Copeland, Dixell, Insinkerator



# Applications: Cold Storage Systems in India



**HyperCITY Retail India Ltd.**  
**Application: Retail**  
**Product: Multi Compressor Semi-Hermetic Rack**

- Low temperature (-35 C) Freezer System
- Medium temperature (-10 C) Chiller System
- Location: Thane
- Advantages: Reliability, efficiency, maintenance



**Creamson India Pvt. Ltd.**  
**Application: Cold Storage**  
**Product : Brine Chiller**

- Application: Ice Candy Machine With A Capacity Of 2000 Candies/hr
- Location: Mumbai



**Amul Dairy**  
**Application: DairyAir Cooled Stream Condensing Unit**

- Application: Blast Chiller – Curd Processing
- Location: Mumbai

Our Brands: Vilter, Copeland, Dixell



# FIRST SOLAR POWER

902, 9th Floor, Eros Corporate Tower, Nehru Place, New Delhi – 110019

www.firstsolar.com



Core Competencies	Energy		Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation								
System Integration for Large projects		✓								
Functional and Technical Architecture for large projects		✓								
Consulting programs and project management		✓								
Social Inclusiveness		✓								
Governance & Delivery Programs										
Data Analytics & Financial Services										
Technology										

**Business Description**  
 We are a vertically integrated Solar company and provide full set of product and solutions form module supply to building, owning and operating utility scale solar power plants

**Business Model**  
 - Solar Module /Other Solar Equipment Sales to Power Developers/ EPC players  
 - Sell of Solar Power under JNNISM and state Solar policies  
 - Sell of Power under Open Access bilateral transactions (BOO)  
 -Sale of complete Power plant design and construction offering under Captive ownership mode

**Proposition for Infrastructure projects/Smart Cities**  
 Product Solar Modules/ mounting structures/ trackers  
 Services EPCM  
 Solutions Sale of Power

**Key Infrastructure Clients**  
 Solar Power Developers like: Reliance Power, Azure, Renew Green Infra, Kiran Energy, Welspun, Acme, buying solar modules  
 The Telangana State Southern Power Distribution Company Limited (TSSPDCL) - who will be purchasing 45 MW AC solar Power from the projects setup by First Solar India

Proven experience / case study		Key Financials	
		Turnover	
		Proposed Investments	



# GLOBAL LEADER IN PV ENERGY SOLUTIONS

## FACTS & FIGURES

**8GW+**  
INSTALLED WORLDWIDE

**3GW+**  
CONTRACTED AC PIPELINE

**~\$9B**  
FIRST SOLAR FACILITATED  
PROJECT FINANCING

**16.1%**  
CDTE MODULE EFFICIENCY  
WORLD RECORD

**99%+**  
POWER PLANT FLEET  
SYSTEM AVAILABILITY

**\$3.4B**  
2012 REVENUE

**\$441M**  
2012 NET CASH  
*Strongest financial stability  
& bankability in industry*

First Solar is powering a new era of globally affordable and accessible solar electricity. Through determined innovation, we have achieved a significant milestone by delivering solar energy that is cost competitive with fossil fuels today. First Solar is delivering greater value by taking energy forward, enabling a world powered by reliable and affordable solar electricity.

## MEETING GROWING ENERGY NEEDS & REDUCING FUEL CONSUMPTION

Our comprehensive PV energy solutions address the energy needs of today and result in reliable, bankable, and profitable solar solutions for our customers and partners worldwide.

### MARKET SEGMENTS

- Grid-connected bulk power systems for utility-scale generation
- Hybrid system solutions to reduce fuel consumption and save costs
- Off-grid and energy access solutions for under-served energy markets
- Solutions for restricted spaces including site constrained locations and distributed generation

### PRODUCT OFFERINGS

- Cost competitive structured energy products including PPA's and other models of energy sales
- Advanced system solutions including AC power blocks and turnkey PV plants
- Components including advanced thin film modules, mono-crystalline silicon modules, single axis trackers and fixed mounting systems

### TECHNOLOGIES & CAPABILITIES



Grid Integration  
& Plant Control  
Systems



Engineering  
& Plant  
Optimization



Project  
Development



Project  
Finance



Advanced PV  
Modules



Balance of  
Systems  
Technologies



Procurement  
& Construction  
Advisement



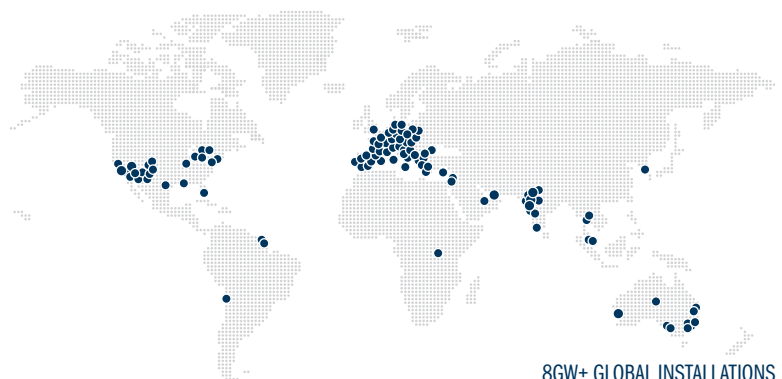
Operations &  
Maintenance

## MAXIMIZE VALUE | MINIMIZE RISK

By integrating technologies, services, and expertise across the entire solar value chain, First Solar delivers more reliable and cost-effective PV energy solutions. Our innovative technologies lower the levelized cost of electricity, increase energy yield, and provide stable and reliable grid integration. Our services and expertise result in the fastest time to power, reliable and predictable solar energy, and bankable solutions that maximize value and minimize risk for our customers and partners.

## TAKING ENERGY FORWARD ON A GLOBAL SCALE

- **LARGEST INVESTMENT GRADE RENEWABLE BOND IN HISTORY**  
Topaz Solar Farm | 550MW AC | California, USA
- **RELIABLE BULK POWER GENERATION UTILIZING ADVANCED PLANT CONTROLS AND FORECASTING**  
Agua Caliente | 290MW AC | Arizona, USA
- **CO-LOCATED WITH A GAS COMBINED CYCLE POWER PLANT**  
Copper Mountain 1 | 48MW AC | Nevada, USA
- **DISPLACING THE ENERGY REQUIREMENTS OF A DESALINATION PLANT**  
Greenough River | 10MW AC | Geraldton, Australia



8GW+ GLOBAL INSTALLATIONS

# FLUOR DANIEL

Building 10 A, 3rd Floor, Cybercity DLF, Phase II, Gurgaon - 122002  
www.fluor.com



Business Description	Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence	
		Power	Renewables Generation	Smart Grid											
<p><b>Business Description</b></p> <p>Fluor Corporation is a global engineering and construction firm that designs and builds some of the world's most complex projects. The company creates and delivers innovative solutions for its Clients in engineering, procurement, fabrication and construction, maintenance and project management on a global basis. For more than a century, Fluor has served Clients in the energy, chemicals, government, industrial, infrastructure, mining &amp; metals and power market sectors. Headquartered in Irving, Texas, Fluor ranks 109 on the Fortune 500 list.</p> <p><b>Business Model</b></p> <p>EPC EPCM EPCFM Project Management</p> <p><b>Proposition for Infrastructure projects/Smart Cities</b></p> <p>Product</p> <p>Services </p> <p>Solutions </p> <p><b>Key Infrastructure Clients</b></p> <p>Listed in Addendum</p>	System Integration for Large projects														
	Functional and Technical Architecture for large projects														
	Consulting programs and project management														
	Social Inclusiveness														
	Governance & Delivery Programs														
	Data Analytics & Financial Services														
Design and manufacture of critical motion control components															
Sub system Integration capability															

## Proven experience / case study

## Key Financials

Turnover

\$27.4 billion

Proposed Investments

# INDUSTRY LEADER GLOBAL REACH PROVEN EXPERTISE

## Corporate Profile



**FLUOR**®



# WE ARE FLUOR CORPORATION

*Taking on tough challenges for more than 100 years*

Fluor is a global leader in engineering, procurement, fabrication, construction, maintenance and project management. Active across six continents, we work with governments and multinational companies to design, build and maintain many of the world's most complex and challenging capital projects.

We have the technical expertise, global reach and financial strength to deliver the best solutions. Fluor is known as a company that is reliable, delivers projects on time and within budget, has an outstanding health, safety and environmental (HSE) record and adheres to the highest ethical standards.

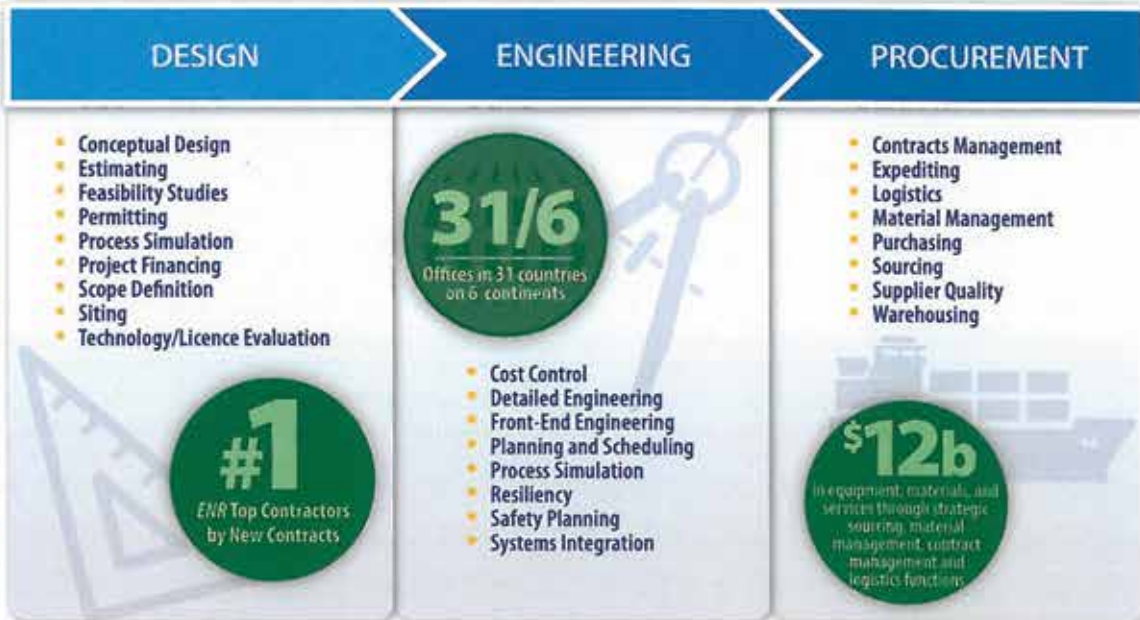


# WE ARE PROBLEM SOLVERS

*Ready to meet any challenge with a full spectrum of services*

Clients trust Fluor to deliver services to optimise their assets, improve their competitive position and increase their long-term business success. Our primary objective is to develop, execute and maintain projects with operational excellence, and we are consistently rated as one of the world's safest contractors. Fluor provides an integrated life-cycle approach to support our Clients' capital investments.

## LIFE-CYCLE APPROACH





## WE ARE AN INDUSTRY LEADER

*Adding value through proven performance and global reach*

- Executing tough projects in challenging locations
- Mobilising diverse workforces
- Linking global engineering resources through strategically placed execution centres
- Sourcing materials using our global procurement network and in-country suppliers
- Meeting compressed schedules
- Developing innovative and cost-effective project financing
- Optimising returns on Clients' capital investments
- Managing joint ventures and alliances



CORPORATE INFORMATION



## WE ARE HSE EXPERTS

*Delivering projects in a safe and environmentally sound manner*



ZERO Incidents™

Safety is a core value at Fluor. We hold sacred the well-being of people – our employees, our Clients and the communities in which we work and live. Industry and governments around the world recognize Fluor for safety excellence.

CONSTRUCTION	START-UP	OPERATIONS & MAINTENANCE
 <p><b>#1</b> FORTUNE magazine's World's Most Admired Companies list in Engineering Construction</p> <ul style="list-style-type: none"> <li>• Construction Management</li> <li>• Craft Staffing and Training</li> <li>• Disaster Recovery</li> <li>• Equipment and Tools Supply</li> <li>• Fabrication</li> <li>• Field Mobilisation</li> <li>• Modular Construction</li> <li>• Project and Programme Management</li> <li>• Quality Control</li> <li>• Safety Programmes</li> <li>• Self-Perform Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Commissioning</li> <li>• Engineering Support</li> <li>• Initial Production</li> <li>• Operational Readiness</li> <li>• Plant Readiness</li> <li>• Precommissioning</li> <li>• Systems Checkout</li> <li>• Turnover</li> <li>• Validation</li> </ul> <p><b>\$300m</b> in programme risks identified and mitigated</p>	 <p><b>14,000</b> technical and craft personnel</p> <p><b>420</b> sites</p> <ul style="list-style-type: none"> <li>• Asset Performance Improvement</li> <li>• Contract Staffing</li> <li>• Facility Management</li> <li>• Plant Engineering</li> <li>• Plant Operations and Maintenance</li> <li>• Small Capital Projects</li> <li>• Turnarounds, Outages and Shutdowns</li> </ul>

CLIENT SOLUTIONS



# GE INDIA

Building No.7A, 4th Floor, DLF Cyber City, DLF Phase III, Sector 25A, Gurgaon - 122 002  
www.ge.com/in



imagination at work

## Business Description

GE's presence in India dates back to 1902 when we installed India's first hydropower plant. Today we bring the best of GE to India by creating technologies and innovations in India, for India. Our local manufacturing facilities are bringing our products, services and technologies closer to our customers.

A long-term player across transportation, energy, healthcare and financial services with over 13,000 employees, GE is committed to partnering India in its growth and development.

## Business Model

Buy-Sell  
Local  
Import

## Proposition for Infrastructure projects/Smart Cities

Product  
Services  
Solutions  
Power Generation,  
Power Transmission,  
Water, Transportation,  
Aviation and Defence,  
Healthcare

## Key Infrastructure Clients

BHEL, Reliance, Wipro, Air India, SBI, Cairn, NTPC, Spice Jet, ONGC, Boruka, Jindal

Core Competencies	Energy		Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation								
System Integration for Large projects	✓	✓					✓	✓		
Functional and Technical Architecture for large projects								✓		
Consulting programs and project management	✓	✓								
Social Inclusiveness			✓				✓			
Governance & Delivery Programs							✓			
Data Analytics & Financial Services	✓	✓								
Technology	✓	✓	✓				✓	✓		✓

## Proven experience / case study

## Key Financials

Turnover	
Proposed Investments	

## GE IN INDIA - FACT SHEET

### At A Glance

GE's presence in India dates back to 1902 when we installed India's first hydropower plant. Today we bring the best of GE to India by creating technologies and innovations in India, for India. Our Technology Centres in Bangalore and Hyderabad are developing new technologies for India and the world. Our 10 local manufacturing facilities are making products worth USD 500 million.

A long-term player across transportation, energy, healthcare, aviation and financial services with over 13,000 employees, GE is committed to partnering with India in its growth and development. With a significant footprint in the country, we believe it is our people and our integrity that truly define us. Integrity and compliance are non-negotiable at GE. As we do business, we do it the right way.

### GE's Presence in India

- **GE Oil & Gas** offers advanced technology equipment and services for all segments of the offshore and onshore oil and gas industry, from subsea, drilling and production, LNG, pipelines and storage to industrial power generation, refining and petrochemicals.
- **GE Power & Water** with a broad array of power generation and energy delivery technologies, GE works in all areas of the energy industry including renewable resources such as wind and solar; biogas and other alternative fuels; and coal, oil, natural gas and nuclear energy.
- **GE Energy Management** designs leading technology solutions for the delivery, management, conversion and optimization of electrical power for customers across multiple energy-intensive industries
- **GE Capital** offers a wide portfolio of product structures including fund for business expansion, growth equity capital, local or cross-border financing, or buying/leasing assets such as corporate aircrafts, automobiles or equipment.
- **GE Transportation** is a supplier to the railroad, marine, drilling, wind and mining industries. It provides cutting-edge freight and passenger locomotives, railway signaling and communications systems, information technology solutions, high-quality replacement parts and value added services.
- **GE Aviation** is the world's leading producer of large and small engines for commercial, military, business and general aircraft, as well as avionics, electric power and mechanical systems.
- **GE Healthcare** presence in India spans across Healthcare Systems (Diagnostic Imaging, Patient Monitoring, Life Support Systems, Home Health, Maternal Infant Care), Surgery, Healthcare IT, Life Sciences and Medical Diagnostics.
- **GE Lighting** offers a wide range of best in class LED Products, Luminaries, Lamps and Control Gears (Ballasts).
- **GE Intelligent Platforms** is a global provider of software, hardware, services, and expertise in Process Automation, Discrete manufacturing, business process management, and embedded computing.
- **India Technology Centres**  
John F. Welch Technology Centre (JFWTC) in Bangalore is GE's largest integrated multidisciplinary Research and Development Center, and the first to be located outside



the US. Hyderabad Technology Centre (HTC) began as an Energy Engineering team in 2006 and has become a hub of excellence for technology from “Exploration to Utilization” of Energy. Over 5300 scientists, researchers and engineers are helping redefine what is possible in the energy, transportation, aviation, healthcare, and consumer and industrial, financial and entertainment business. Through the work done at these centres, over 3000 patents have been filed by GE.

In addition to these, GE has Research Centers in New York (US), Shanghai (China), Munich (Germany) and Rio De Janeiro (Brazil) that are helping create game-changing technologies and innovations to ensure GE's growth and leadership.

### Local Partnerships

Driven by focus on meeting needs of Indian customers and developing localized solutions, GE has partnered with a number of Indian companies across businesses including, energy, infrastructure and financial services.

- BHEL
- SBI
- Wipro
- Triveni

### Key Milestones Achieved

- 1902: Set up India's first hydropower plant in Karnataka
- 1969: Set up nuclear reactors at Tarapore
- 1986: Partnership with BHEL for gas turbines
- 1989: Joint venture with Wipro: GE Healthcare established
- 1997: Joint venture with BHEL established for gas turbine services
- 1998: Joint venture with SBI established
- 1998: Pioneered business process outsourcing
- 1999: Established JFWTC (Now GE India Technology Centre) at Bengaluru
- 2003: GE selected to power the Limited Series Production of LCA Tejas
- 2010: Established a manufacturing facility for wind turbines in Pune
- 2010: Joint venture with Triveni for steam turbines
- 2013: Consortium led by Wipro GE Healthcare entered into a public-private partnership with the Government of Maharashtra to upgrade advanced healthcare equipment in district hospitals
- 2014: Announced the 1.7-103 wind turbine, GE's first wind turbine developed and engineered specifically for India's low wind speed conditions
- 2015: GE Multi-modal Manufacturing Facility at Chakan, Pune inaugurated by Indian Prime Minister, Shri Narendra Modi

## Corporate Citizenship

At GE, corporate citizenship is not merely a program or a set of good intentions, but a set of behaviors and actions that are integrated with the business strategy of the company.

**GE Volunteers:** GE Volunteers is a global community service organization of more than 52,500 GE employees and retirees in 143 chapters with a presence in 44 countries. GE Volunteers are committed to improving their communities, their company and their lives through volunteerism, leadership and camaraderie. The India Volunteers team has over 3,500 members and has grown to five chapters - New Delhi, Bangalore, Hyderabad, Chennai and Mumbai. In 2011, GE Volunteers spent over 23,500 volunteer-hours, partnering with 35 not-for-profit organizations to support projects across 12 Indian cities.

**GE Foundation:** GE Foundation, the philanthropic foundation of the GE, invests in improving educational quality and access as well as strengthening community organizations around the world. The GE Foundation India Scholarships are awarded to students who have the potential to become future leaders and who are pursuing post graduate courses in engineering, science and management. The GE Foundation has awarded scholarships to over 260 students across 25 institutes amounting to US \$1,371,000.

## Diverse Talent

The GE Women's Network is a voluntary organization formed to support the professional development of women at GE. It was established to build a pipeline of high potential women in senior leadership roles. Development is focused on leadership, advancement and career-broadening opportunities through a variety of tools, including information, education, leadership interaction and networking with other women to share and learn best practices. Launched in India in 2002, the GE Women's Network has a vibrant presence across key locations of GE in the country.

### Contact Us:

Twitter: <http://twitter.com/geindia>  
LinkedIn: <https://www.linkedin.com/company/1015>  
Facebook: <https://www.facebook.com/GEIndia>  
Youtube: [www.youtube.com/GEIndia](http://www.youtube.com/GEIndia)

###

# GENERAL MOTORS INDIA PVT. LTD



Business Description	Core Competencies	Energy			Smart Transportation	Logistics	Aviation	ICT & IT Enabled Services	Disaster Management	Safety, Surveillance & Critical Infrastr Security	Public Health	Water Treatment	Waste Management
		Power	Renewables Generation	Smart Grid									
	System Integration for Large projects			✓									✓
	Functional and Technical Architecture for large projects			✓								✓	
	Consulting programs and project management			✓						✓			✓
	Social Inclusiveness												✓
	Governance & Delivery Programs												
	Data Analytics & Financial Services												

**Business Model**  
Build & Sell Cars

**Proposition for Infrastructure projects/Smart Cities**

**Product**

**Services**

**Solutions**

**Key Infrastructure Clients**

**Proven experience / case study**

**Key Financials**

Turnover

Proposed Investments

## ABOUT GENERAL MOTORS

- Throughout its history, General Motors has been at the forefront of technological change and innovation in the automotive industry. We believe we will see more change in our industry in the next five years than we have seen in the past 50 years. New technology is driving tremendous advancements in everything from safety and vehicle connectivity, to fuel efficiency and electrification. And societal trends like urbanization and sustainability are changing the way customers think about and interact with automobiles.
- GM's global business strategy is focused on: our core business of designing, engineering, manufacturing and selling world-class vehicles; and investing the future of mobility.
- In terms of the future of our industry, GM's priority investments focus on: clean energy (for advanced propulsion); vehicle connectivity (for information); advanced materials (to improve fuel economy and safety); sensors, processors and memory (for development of autonomous cars), and manufacturing technology (to boost productivity and reduce costs)
- GM is moving quickly establish the right business structures, partnerships and alliances to lead change in our industry.
- All of GM's innovation initiatives—the creation of a corporate innovation process, a new organizational structure and focus for the R&D Center, portfolio management of R&D work, and collaborative research partnering—ensure that GM is well positioned to provide critically needed technologies. These developments support the company's business strategy to bring to market innovative products, processes, and services that will meet the needs of and delight customers around the world.



## GENERAL MOTORS' EXPERTISE

- The key objective of Smart Cities Mission by the Government of India is to drive economic growth and improve the quality of life of people by enabling local development and harnessing progressive technology as a means to create smart outcomes for citizens.
- GM has been reinventing vehicles since its inception and has improving safety, performance, and fuel economy through innovation
- GM has advanced next electric and autonomous technology which will be safer and advanced
- Key brand pillars at GM are: Design, Technology and Performance with an underlying emphasis on safety and quality. We are strongly committed to safety as a company
- GM is where the brightest minds come together to build exceptional automobiles and to strive towards being the best in technology, safety, and innovation
- GM's expansive Research and Development Network extends to universities, government groups, suppliers, and strategic partners to expand GM's technical capabilities and speeding technology development
- For domestic and export markets, GM India is focused mainly on small cars with efficient engines and high-tech connectivity features, which gives our customers a comfortable, safe and a world-class driving experience.

## CONNECTIVITY



- Advanced systems, such as Chevrolet's MyLink phone projection, are being deployed to enable consumers with voice recognition, connectivity and navigation support.
- MyLink gives customers plenty of easy and smart ways to stay connected and keep their focus on the road. The next generation of MyLink offers easy-to-use, enhanced interfaces, as well as the exciting new compatibility with Android Auto™ and Apple® CarPlay.™
  - ✓ The technology has been introduced for the first time in India, to meet the evolving needs of today's tech-savvy, always-connected consumers and the Smartphone connectivity helps to access important phone features from the vehicle
  - ✓ Apple CarPlay is the smarter, simpler way to use your iPhone in the car. It enables drivers to place calls, listen to music, send and receive messages, obtain directions optimized for traffic conditions and access third-party audio apps on your iPhone, all while staying focused on the road.
  - ✓ Android Auto: Targeted for Android phones, Android Auto shares information while driving and makes it easy to access the best of Google. The system features Google Maps with free voice-guided navigation, live traffic information and lane guidance; on-demand access to 30 million songs with Google Play Music; the ability to place phone calls or send and receive messages while keeping your hands on the wheel.

## GLOBAL INNOVATIONS



- As Mary Barra says: "The automotive industry is changing more now than it has in the last 5 years."
- Rapid social changes and development and availability of technologies in like Connectivity, Sharing, Autonomous and Alternative Propulsion, such as Electrification, enable us to shape the future of personal mobility.
- It is the conversions and integration of these technologies that we are working across multiple fronts, and countries to create an integrated network of Technological driven vehicles.
- GM believes it is the convergence of all these that will shape the future of personal mobility.

## ELECTRIFICATION

- GM is a leader in electrification, with a strong portfolio, including the **Chevrolet Volt**, **Malibu Hybrid**, **Bolt EV**, **Spark EV** and **Cadillac CT6 Plug-In**.
- The **Bolt EV is a game-changer** ... a long-range electric vehicle with a range of more than 380 km. We are bringing EV technology to everyday consumers.
- In 2017, GM will launch the **Chevrolet Bolt EV** in our region in **Korea**. We are assessing further markets for the car **beyond** North America, Europe and Korea.

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GENERAL MOTORS





## AUTONOMOUS

- The **Bolt EV** is also the centerpiece of our autonomous vehicle strategy.
- Following GM's acquisition of **Cruise Automation**, the company's engineers are testing **Chevrolet Bolt EVs** with autonomous technology in San Francisco and Scottsdale, Arizona.
- Testing of autonomous cars is also underway at GM's Technical Center campus in Metro Detroit, Warren and Michigan
- Safety is a cornerstone of our approach to autonomous vehicles — because it has huge potential to reduce the human operator error that is the cause of over 90% of vehicle crashes.
- These are exciting times for our company and our industry — and we have the strategy in place to ensure we are successful today with our core business and that we will lead the industry in the future.

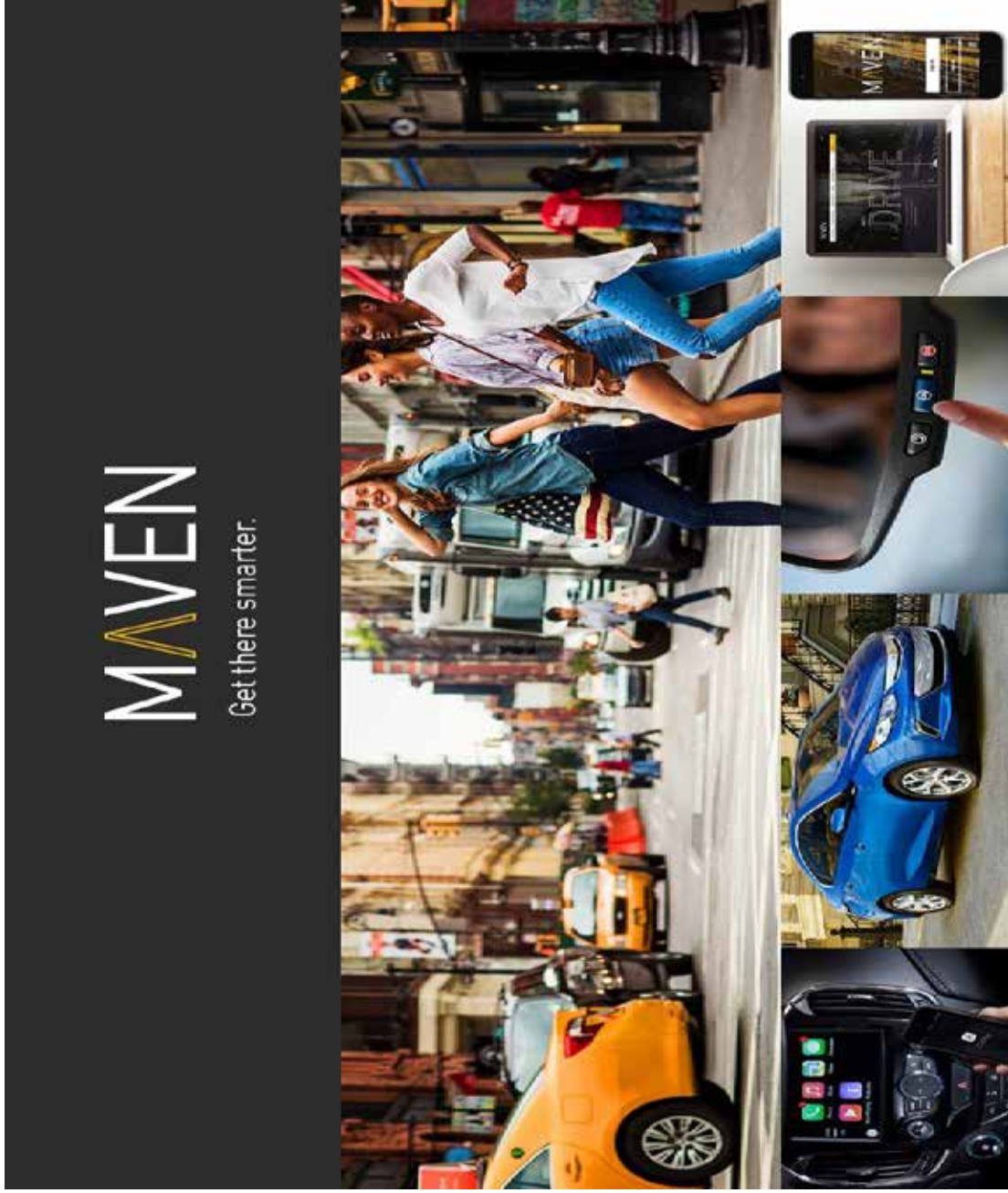
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GENERAL MOTORS



## SHARING

- Another important change shaping personal mobility is the growth of **car sharing**.
- That's why we have launched **Maven** – our **car-sharing service**.
- **Maven** combines and expands the company's multiple programs under a **single brand**.
- It operates in **13 U.S. cities**, as well as **Germany, China and South America**.
- In some **GMI markets**, high population density in major cities, fast adoption of technology and good communication networks in urban areas can create high demand for car-sharing services.



GENERAL MOTORS



**OnStar**



- OnStar empowers you to stay connected to your world
- OnStar Corporation is a subsidiary of General Motors that provides subscription-based communications, in-vehicle security, hands-free calling, turn-by-turn navigation, and remote diagnostics systems throughout the United States, Canada, China, Mexico, Europe, Brazil, and Argentina. A similar service is known as Opel OnStar in western Europe and ChevyStar in Latin American markets (except in Mexico, Brazil and Argentina).

**GENERAL MOTORS**

**GM CONFIDENTIAL**

# HONEYWELL INTERNATIONAL

1st Floor, Unitech Trade Centre, Sector 43, Block C, Sushank Lok 1, Gurgaon - 122001  
www.honeywell.com



## Business Description

Honeywell is a Fortune 100 company (www.honeywell.com) that develops and manufactures technologies to address some of the world's toughest challenges linked to global macro trends such as energy efficiency, clean energy generation, safety and security, globalization and customer productivity. Each of the company's global businesses – Aerospace, Automation and Control Solutions, and Performance Materials and Technologies – has a significant presence in India. For additional information on Honeywell India, please visit <http://honeywell.com/country/in/>

## Business Model

From new development to maintenance, basic upgrades to comprehensive improvements, HBS' approach of consulting, solution development, deployment and lifecycle engagement drives better business outcomes for its customers. HBS works in a wide range of buildings and mission critical facilities throughout India, including commercial offices, stadia, metro stations, airports, hospitals, universities, government buildings, and pharmaceutical facilities.

## Proposition for Infrastructure projects/Smart Cities

Product	Distributed control systems, factory automation, Surveillance, Access Control, Intrusion, Integrated building management systems, fire safety, public address, personal protective equipment, Other
Services	Design, installation, commissioning, operations, including asphalt additives, ground based augmentation systems
Solutions	for airport decongestion, turbopropellers for vehicle engine fuel efficiency.

## Key Infrastructure Clients

Serving a diverse and extensive customer base across verticals including oil and gas, power, metals, pharmaceuticals, chemicals, mining, infrastructure, IT/ITES, telecom, banking, healthcare, hospitality, automobiles, defense, aerospace. Our partners include DMRC, Wankhede Stadium, Delhi, Kolkata and Chennai airports, IOCL, Reliance Tata, Manipal University, Dr. Reddy's Laboratories, and Sankara Netralaya.

Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid								
System Integration for Large projects	✓		✓		✓	✓	✓				
Functional and Technical Architecture for large projects	✓		✓		✓	✓	✓				
Consulting programs and project management	✓		✓		✓	✓	✓				
Social Inclusiveness	✓		✓		✓	✓	✓				
Governance & Delivery Programs	✓		✓		✓	✓	✓				
Data Analytics	✓		✓		✓	✓	✓				
Technology											

## Proven experience / case study

Turnover

Close to \$1 Bn in domestic sales and exports alone

Proposed Investments





**Smart City Credential**  
**Honeywell Automation and Control**  
**Solutions India**  
**Honeywell**

# Who Is Honeywell?

**Honeywell**

## Business Overview

## Great Positions In Good Industries



**\$39.1B** **55%**

in sales for 2013 sales outside U.S.

- 1,300 sites, 68 countries
- 131,000 employees
- Morristown, NJ headquarters
- Fortune 100



Honeywell developed the first autopilot flight controller (1914), first commercial weather radar system (1954), and first business jet turbofan engine (1975), and is still the leader in developing revolutionary technology for aerospace today.



Honeywell pioneered automotive turbocharging 60 years ago and remains the industry leader launching, on average, 100 new turbo applications globally each year.



Honeywell is the leader in gas detection, fire systems, personal protective equipment, building controls, home comfort and security, and scanning and mobility.



Honeywell's technology is used to produce more than 60% of the world's gasoline, 67% of the world's paraxylene (a precursor for polyester), and 85% of the world's biodegradable detergents.

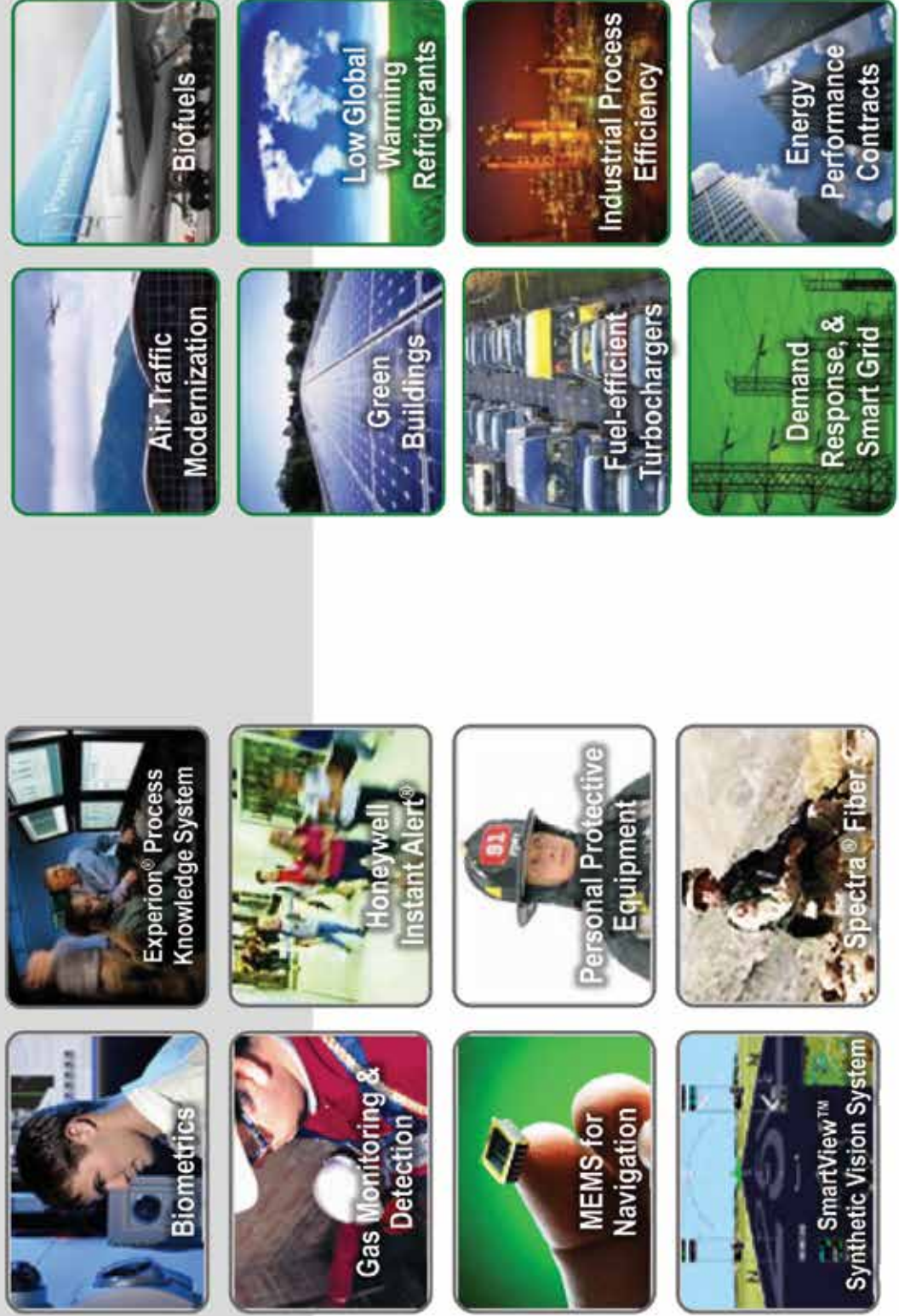
<p><b>Aerospace</b></p> <p><b>\$16.7 Billion</b></p>	<p><b>Automation and Control Solutions</b></p> <p><b>\$13.5 Billion</b></p>	<p><b>Performance Materials and Technologies</b></p> <p><b>\$9.9 Billion</b></p>
--	---	--

(2013 Sales, \$B)



# Safety, Security and Energy efficiency

**Honeywell**



Today's Honeywell

# Honeywell India

**Honeywell**

## Honeywell

- An eight-decade India legacy
- More than \$1B in domestic sales and exports
- ~13,000 employees, including 8,000 engineers across 50 cities
- ~10% of Honeywell employees
- 7 manufacturing locations
- 5 global technology & engineering centers

## Automation and Control Solutions

- >2,000 employees across 50 cities
- >220,000 sq ft manufacturing, design & engineering facilities; 5 cities
- Solutions businesses deliver **building solutions (HBS)**; product businesses provide **environmental and combustion controls (ECC), life safety (HLS), security (HSG)**, sensing and control, and scanning and mobility products
- Global Services – provides high quality, cost optimized project engineering and product development services
- Energy efficiency offerings – rated Grade 1 ESCO by BEE



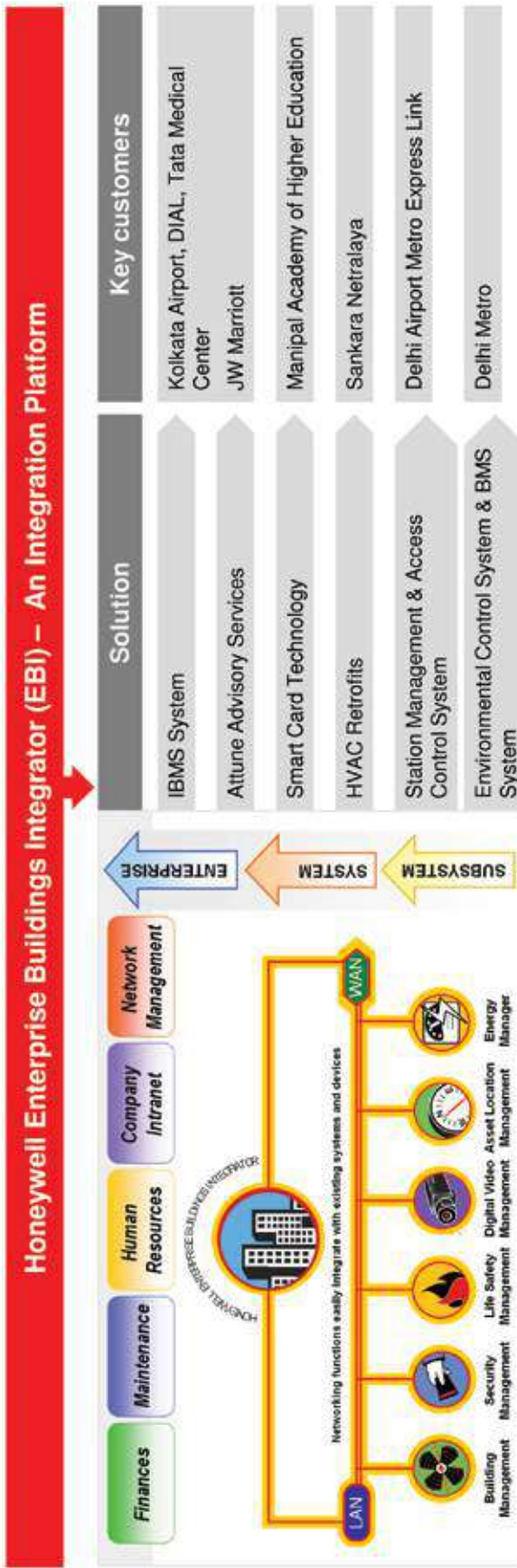


# About HBS

Honeywell

**“Automate environment to ensure safety , security, comfort and energy efficiency”**

Honeywell Building Solutions has evolved into India's leading, one-stop provider for intelligent buildings with a complete portfolio in a wide range of buildings and mission critical facilities around the world and throughout India, including; commercial offices, stadia, metro stations, airports, hospitals, universities, government buildings and pharmaceutical facilities. Headquartered in Pune, Maharashtra, Honeywell Building Solutions has a strong local presence with ten branch offices and rapidly expanding to more cities



Today's Honeywell

# HBS Credentials [1/2]

**Honeywell**

## Key Projects: India

#	Name of the customer	Honeywell offering	Location	Description
1	GIFT (Gujarat International Finance Tech) City	Honeywell Video Management System / Digital Video Manager (DVM) Honeywell Enterprise Integrated Solution / Enterprise Building Intergrator (EBI) Honeywell Video Management System / Digital Video Manager (DVM)	Gujarat	Honeywell EBI integrated with DVM connects life safety, security systems to the BMS systems. Converged IP backbone was developed by Honeywell for system connectivity, with state of the art control centre. The entire IBMS system is redundant thus providing data safety & system continuity.
2	Odisha Police	Honeywell Enterprise Integrated Solution / Enterprise Building Intergrator (EBI) Radar Video Surveillance System for GIS Map	Bhubaneshwar	The project scope includes city-wide surveillance with integrated CCTV and automatic number plate reading cameras (ANPR) as well as a command and control system for creation of common operating picture. The command and control system is integrated with emergency response system and traffic management systems. To achieve this, the Honeywell solution comprised a combination of our signature solutions integrated with third-party technology.
3	Technology parks: CTS Manyata	Honeywell Integrated Building Management System (IBMS) Honeywell Video Management System / Digital Video Manager (DVM) Honeywell Energy Management System (Attune Advisory Services)	Bangalore	Attune Advisory Services helps in tracking the CTS facility's energy consumption against targets & having visibility into their energy consumption patterns with the goal of understanding their carbon footprint & identifying potential energy cost saving opportunities.
4	Transportation : Delhi International Airport Ltd.	Airport Ground Honeywell Enterprise Integrated Solution / Enterprise Building Intergrator (EBI) Airport Ground Lighting System / Addressable Switch Device (ADV)	Delhi	The scope includes BMS (Building Management System), HVAC Central Management System and Addressable Switch Device for the new Terminal building. The integrated systems include the Airport Operation Control Centre (AOCC) to control and monitor the critical facilities and services across airports that increase the productivity, reduce power consumption, faster communication
5	Hospitality: Renaissance Hotel and Convention Centre	Honeywell Energy Retrofit Solutions	Mumbai	The strategic, innovative conservation measures developed include, HVAC Upgrades, Chiller plant improvements, Hot water upgrades, Sewage treatment plant improvements & lighting improvements.
6	Kolkata Airport	Honeywell Integrated Building Management Solution (IBMS) Airground Lighting	Kolkata	The scope includes Fire Alarm System, Building Management System (BMS) - Comfort Point, Flight Information & Display System (FIDS) and Public Address & Voice Alarm System (PAVA)

Today's Honeywell



# HBS Credentials [2/2]

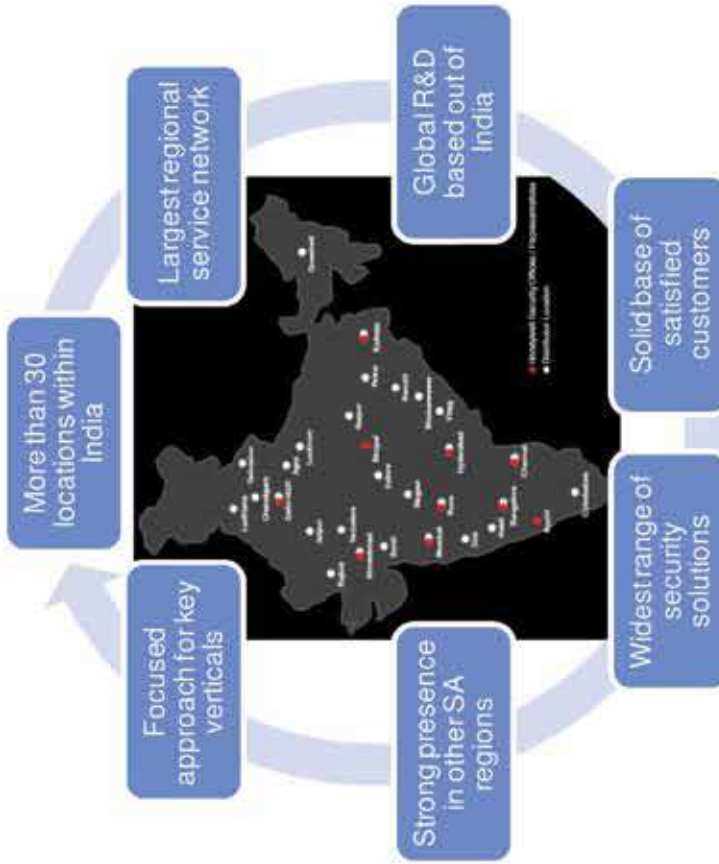
**Honeywell**

## Key Projects: India

#	Name of the customer	Honeywell offering	Location	Description
7	Education: Manipal University	Honeywell's Smart Card technology Honeywell Video Management System / Digital Video Manager (DVM)	Karnataka	The scope includes Honeywell's Smart Card technology combined with Temaline™ solutions-based access control system and Digital Video Manager™-based CCTV systems, provided the assurance for a centralised security solution
8	Healthcare: Tata Medical Centre	Honeywell Enterprise Integrated Solution / Enterprise Building Intergrator (EBI) Honeywell Integrated Building Management Solution (IBMS)	Kolkata	The scope comprises of various systems such as Life Safety system, CCTV system. Access Control System, Public Address System,
9	Industrial building : Tata Steel	Honeywell's integrated security and life safety management (IBMS) Honeywell Enterprise Integrated Solution / Enterprise Building Intergrator (EBI)	Kolkata	Honeywell's, integrated core technology included smoke and fire detection, access control, intruder detection, CCTV and PAVA. This seamless integration allowed data to be pulled from all sub-systems enabling Operator to view and control from a single workstation.
10	Sports complex: Wankhede, Hyderabad	Honeywell security and life safety management solutions Honeywell Integrated Building Management Solution (IBMS)	Mumbai	The scope of the order includes Spectator Management System, Public Address System, Fire Alarm System, CCTV, Access Control System and Spectator Management System.

# About HSG

**Honeywell**



**Video**

**Intrusion**



**Access Control**

**Home Systems**



**Product Menu**

Product
Video Surveillance
Access Control
Intrusion Alarms
Home Systems

Usage
IP / Analogue Systems, Video Management, Video Analytics, Integrated Platforms
Access Control, Biometrics T & A, Readers & Credentials, Visitor Management
Wired & Wireless Intrusion Alarms, Residential Security, Commercial Solution
Video Door Phones, Lighting Switches, Appliance Control, Home Automation

Verticals
Industrial, Commercial, Government, IT / ITES, Hospitality
Banking, Pharma, Telecom
Banking, Retail, Commercial
Residential

Today's Honeywell



# About HFS

**Honeywell**

			
100+ employees	16000 Sq. ft. of manufacturing area	Toll Free Tech Support No	Sales presence in more than 30 cities in India

Product Menu	
Brand	Usage
Notifier – Addressable Fire Alarm System	Large infrastructures such as IT/ITES, Hotels, Hospitals, Infrastructure, Retail, Shopping Malls etc
ESSER – Addressable Fire Alarm System	Hospital, Industrial, Hospitality etc
Morley-IAS – Addressable Fire Alarm System	Mid market application such as Offices, Retail, Shopping Malls etc
Fire-Lite Alarms – Addressable Fire Alarm System	Low cost mid market application such as Offices, Retail, Shopping Malls etc
System Sensor – Conventional Fire Alarm System	Residential, Retail, Shopping Malls etc
Public Address & Voice Alarm System	PA VA System for Offices, Retail, Shopping Malls, IT/ITES, Hotels, Industrial, Large Infra,
Key customers	
<ul style="list-style-type: none"> <li>Parliament House, Delhi</li> <li>Gujarat High Court, Ahmadabad</li> <li>Commercial offices: Saudi Arabia Embassy, WHO Delhi, Star Sports Mumbai, iGate Chennai</li> <li>Hyderabad Metro</li> <li>Tata Housing complex</li> <li>IIT Mumbai</li> <li>TCS campus</li> </ul>	



Today's Honeywell

# HFS Credentials

**Honeywell**




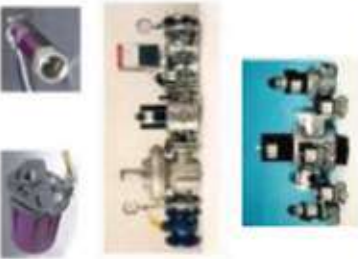
## Key Projects: India

#	Name of the customer	Honeywell offering	Location	Description
1	Nanded township	Advanced fire detection & evacuation	Pune	Large integrated residential township with 70 residential towers, schools, hospitals & commercial complexes
2	Delhi International Airport T3	Advanced Integrated fire solution	Delhi	Largest airport building in terminal 3
3	Parliament House	Advanced Integrated fire solution	Delhi	Integrated fire alarm solution for Parliament
4	AIIMS : 6 hospitals	Advanced fire detection & evacuation	Pan India	6 new AIIMS hospitals in Bhubaneswar, Raipur, Jodhpur, Rishikesh, Bhopal, Patna across India
5	Delhi Metro (DMRC)	Fire detection & evacuation	Delhi	100+ stations of Delhi metro including underground stations

# About ECC



- ~400 Employees
- ~140 Customer Associates
- ~9 Sales Offices
- Extensive Distribution Network
- 2 Manufacturing Facilities at (Dehradun, Chennai)

Electrical	Homes & Field Devices	Building Control Systems	Commercial & Industrial Combustion
 <ul style="list-style-type: none"> <li>- Wiring Devices</li> <li>- Cable Management</li> <li>- Circuit Protection Devices</li> </ul>	 <ul style="list-style-type: none"> <li>- HVAC controls</li> <li>- Solar water Heaters</li> <li>- Actuators, Valves</li> <li>- FCUs</li> <li>- Thermostats</li> <li>- Indoor Air Quality Controls</li> <li>- Field Devices</li> </ul>	 <ul style="list-style-type: none"> <li>- Building Management Systems</li> <li>- Airflow control solutions for Critical areas</li> <li>- Lighting Management Systems – Astral, Lighting control</li> </ul>	 <ul style="list-style-type: none"> <li>- Industrial Burners</li> <li>- Burner Gas Train System</li> <li>- Safety Shut off Valves</li> <li>- Burner Management System</li> <li>- Flame Detectors</li> <li>- Sequence Controllers</li> <li>- Solenoid Valves</li> <li>- Pressure Switches</li> <li>- Modulating Motors</li> </ul>



# HSG Credentials

**Honeywell**

## Key Projects: India

#	Name of the customer	Honeywell offering	Location	Description
1	Bhubaneswar City Surveillance	2 MP IP cameras and PTZ cameras	Bhubaneswar	Robust video system for surveillance at 28 important crossing across the city. The solution offered comprised 110 2 MP IP cameras, 80 PTZ cameras and mobile DVRs.
2	Vidhan Sabha	HUS + IP Cams	Bangalore	Offering is IP surveillance for legislative assembly with HUS as main platform.
3	IOCL WRPL	Ex-proof Cameras +IP cameras	Rajkot	End-to-end solution IP explosion proof cameras system for IOCL facility which conforms to the safety standards & various industrial grade certificates like ATEX, CCOE, etc.
4	Shell R&D centre	HUS + IP Cams + Ex-proof IP Cams + PW	Bangalore	Explosion proof cameras for highly inflammable environment integrated with Video and Access control platform. HUS provided seamless integration for access control (Pro-Watch) & video surveillance.
5	Karnataka prisons	2 MP IP PTZ cameras , 3 MP IP Cameras	Bangalore, Belgaum	High clarity video surveillance solution to manage prison facility
6	Tuticorin Thermal Power Station	HUS +IP Cams	Tuticorin	Perimeter surveillance for a thermal power plant. Over 200 PTZ cameras were deployed.
7	PNB	960H DVR	All across India	Solution to centrally monitor bank branches spread across different locations. Solution included 2-way audio on a CMS platform with alarm notification on camera tampering.
8	IRB Toll Plazas	HUS with DVR's & Analog cameras	Maharashtra	Video surveillance solution for toll gates. Honeywell solution addressed key requirement of high quality video recording during night and pushing critical events to central monitoring station
9	State Bank of Travencore	Analog CCTV solution for multiple branches	Pan India	Tailor made solution to suit requirements of the Bank and secure 600 branches.

ywell



# ECC Credentials

**Honeywell**

## Key Projects: India

#	Name of the customer	Honeywell offering	Location	Description
1	IIT	Blenze range, FDS, CM-Wall, LMS-Sensors	Gandhinagar	IIT Gandhinagar, is setting up its new campus with administrative, facility blocks and hostels. We had tough competition from Legrand for the complete EP package, but managed to prevail because of our excellent relationship with the complete value chain and our on time response to their technical queries Employees' State Insurance Corporation (ESIC) has taken initiative in starting the Medical College and the Post Graduate Institute of Medical Sciences and Research (PGIMSR) at Joka, Kolkata. This is the first endeavor in the field of Medical Education. The Goals to Achieve through BMS <ul style="list-style-type: none"> <li>• Increase functionality by integrating systems onto single platform</li> <li>• Control building from one location</li> <li>• Control individual rooms based on schedule</li> <li>• Manage climate control in key areas</li> <li>• Optimize energy savings</li> </ul>
2	ESIC Joka	WEBS-AX BMS, VFDs, VAV, Butterfly Valves, Venturi Valves	Kolkata	Developed by international real estate firm Hines and India's DLF Ltd. and designed by world renowned Robert A. M Stern Architects, the One Horizon Center is a 25 storey Building.
3	One Horizon Centre	WEBS-AX BMS, VAV	Gurgaon	The Honeywell WEBS-AX building automation systems provide an open system that allowed Hines integrate various MEP systems while improving building management, reducing maintenance costs, and increasing energy savings. WEBS-AX allows the seamless integration of all building services to a central location, allowing alarms to be automatically consolidated, monitored and escalated. Meter histories are automatically collected for analysis
4	Banasthali University	2500 LPD and 1250 LPD connected to single point hot water tap at each floor of building.	Rajasthan	With a total 32 Hostel Buildings having strength of 14000 + Girls, Banasthali University in Rajasthan, employed an old hot water generation process using wood fired boilers. Honeywell ECC deployed a state of the art Solar Hot Water systems based on ETC technology due to Hard water with a capacity of 500 LPD and 1250 LPD connected to single point hot water tap at each floor of building

**We are building a world  
that's safer and more secure...  
more comfortable and energy efficient...  
more innovative and productive...**

**Honeywell**

# HP INDIA



Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Food Safety / Security	Water Treatment	Waste Management
	Power	Renewables Generation	Smart Grid										
System Integration for Large projects					✓	✓		✓	✓	✓		✓	✓
Functional and Technical Architecture for large projects					✓	✓		✓	✓	✓		✓	✓
Consulting programs and					✓	✓		✓	✓	✓		✓	✓
Social Inclusiveness					✓	✓		✓	✓	✓		✓	✓
Governance & Delivery Programs					✓	✓		✓	✓	✓		✓	✓
Data Analytics & Financial Services	✓	✓	✓		✓	✓		✓	✓	✓		✓	✓

**Business Description**  
 HP is a technology company that operates in more than 170 countries around the world. We explore how technology and services can help people and companies address their problems and challenges, and realize their possibilities, aspirations and dreams. We apply new thinking and ideas to create more simple, valuable and trusted experiences with technology, continuously improving the way our customers live and work.  
 HP's mission is to invent technologies and services that drive business value, create social benefit and improve the lives of customers — with a focus on enhancing the lives of the greatest number of people possible.

**Business Model**  
 HP can support typically most business models and has relevant and rich experience having transformed a large number of projects worldwide for Smart Cities and other Public Sector initiatives.

**Proposition for Infrastructure projects/Smart Cities**

Product	IT Infra, Software, End user devices
Services	DC Build, Project Management, Skill development
Solutions	Hhealthcare, Educatio, Transportation, Safety & Surveillance

**Key Infrastructure Clients**  
 Various State Electricity boards for APDRP, CCTNS, UID DoP and various state Governments, Various Revenue Departments, Defense, Railways, India Post etc. Private sector players like Tata, Reliance, ITC, Dabur etc for numerous solutions. Telecom vendors like Airtel, Vodafone, MTS etc

Key Financials	
Turnover	
Proposed Investments	

**Proven experience / case study**





Business Description	Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Food Safety / Security	Water Treatment	Waste Management	
		Power	Renewables Generation	Smart Grid											
Business Model	System Integration for Large projects	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	Functional and Technical Architecture for large projects	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Proposition for Infrastructure projects/Smart Cities	Consulting programs and	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	Social Inclusiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	Governance & Delivery Programs	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Product	Data Analytics & Financial Services	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Services															
Solutions															
Key Infrastructure Clients	Proven experience / case study													Key Financials	
															Turnover



## IBM Business Description



The **International Business Machines Corporation (IBM)** is an American multinational technology and consulting corporation. IBM manufactures and markets computer hardware and software, and offers infrastructure, hosting and consulting services in areas ranging from mainframe computers to nanotechnology.

The company's Global Technology Services segment provides IT infrastructure and business process services, including outsourcing, process, integrated technology, cloud, and technology support. Its Global Business Services segment offers consulting solutions for strategy and transformation, application innovation, enterprise applications, and smarter analytics; and application management, maintenance, and support services. IBM's Software segment offers middleware and operating systems software, such as WebSphere software to integrate and manage business processes; and information management software for database and enterprise content management, information integration, data governance, data warehousing and analytics, business analytics and intelligence, and predictive analytics. This segment also provides Tivoli software for cloud and datacenter management, enterprise endpoint and mobile device management, asset and facilities management, storage management, and security systems; Rational software that supports software development; and Mobile Software for platform and application development, mobile security, and mobile device management. The company's Systems and Technology segment provides computing power and storage solutions; and semiconductor technology, products, and packaging solutions. Its Global Financing segment provides lease and loan financing to end users; commercial financing to dealers and remarketers of IT products; and remanufacturing and remarketing services for equipment.

IBM has 12 research laboratories worldwide and, as of 2013, has held the record for most patents generated by a company for 20 consecutive years. Its employees have garnered five Nobel Prizes, six Turing Awards, ten National Medals of Technology, and five National Medals of Science. Notable inventions by IBM include the automated teller machine (ATM), the floppy disk, the hard disk drive, the magnetic stripe card, the relational database, the Universal Product Code (UPC), the financial swap, the RDBMS and SQL, SABRE airline reservation system, DRAM, and Watson artificial intelligence.

International Business Machines Corporation was founded in 1910 and is headquartered in Armonk, New York. IBM India Private Limited is the Indian subsidiary of IBM.

### References:

- <https://finance.yahoo.com/q/pr?s=IBM+Profile>
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## IBM Business Model



Accelerating advances in technology, a fast-changing and dynamic marketplace, demanding customers, mounting global competition, and pressure from investors are today's reality. Business leaders have long used information technology to improve productivity and efficiency, reach new markets and optimize supply chains. What's new is that customer expectations have also changed.

As a leader, IBM has responded to this shift. Taking advantage of the opportunity to innovate, differentiate and grow, IBM leads in enabling digital transformation. IBM offers a cohesive strategy for integrating digital and physical elements to successfully transform business models of clients - and set new directions for entire industries. With agility and efficiency, IBM collaborates with external partners, providing business and technical expertise, leveraging the newest technologies to enable globally integrated customers evolve in technology, operations, and work patterns.

### References:

<http://www.ibm.com/governmentalprograms/hrbiz.html>

<http://www.cnbc.com/id/101544248#>.

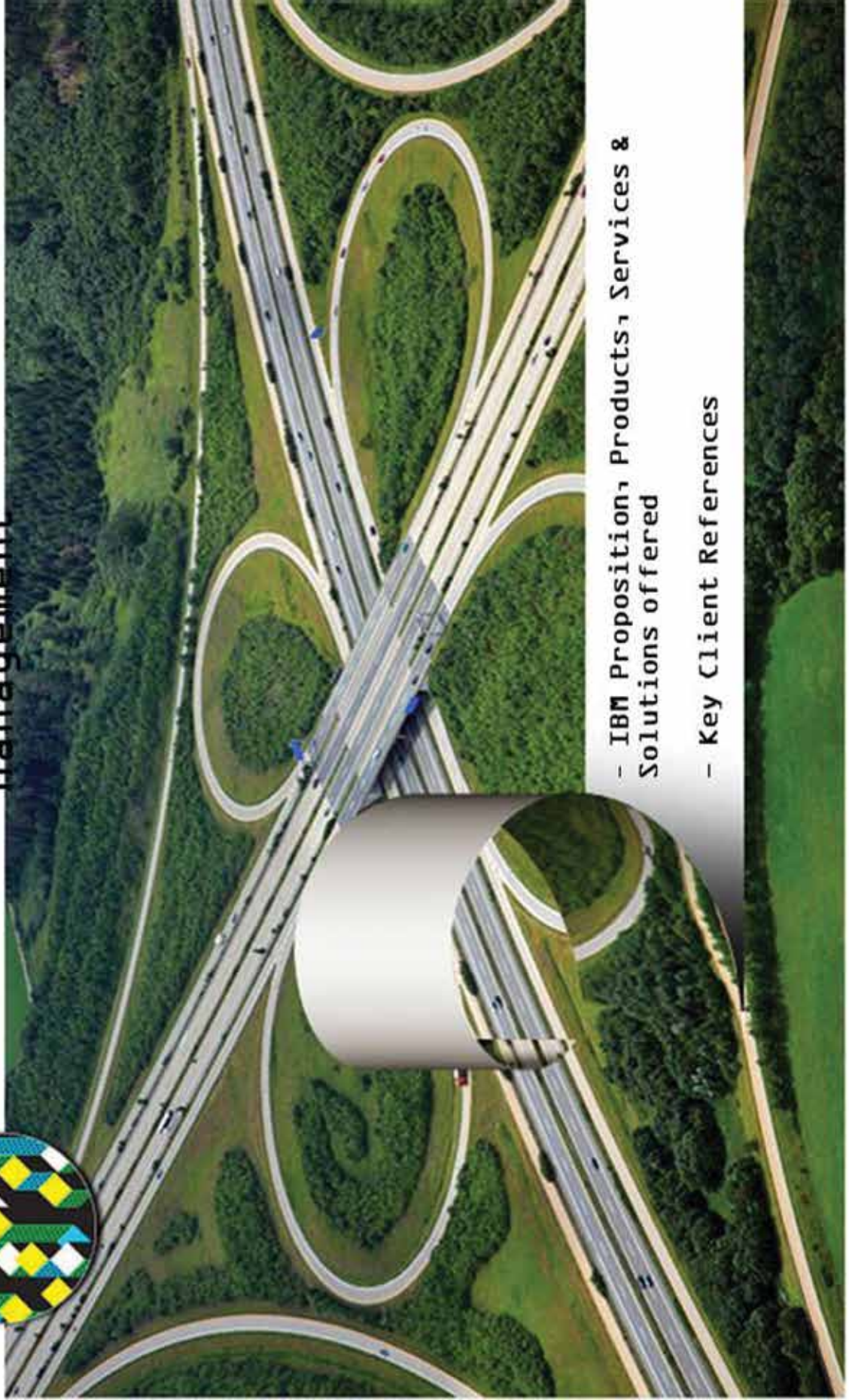
<http://www-935.ibm.com/services/in/gbs/thoughtleadership/ibv-digital-transformation.html>

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## Addendum 2 : IBM Smarter Transportation Management

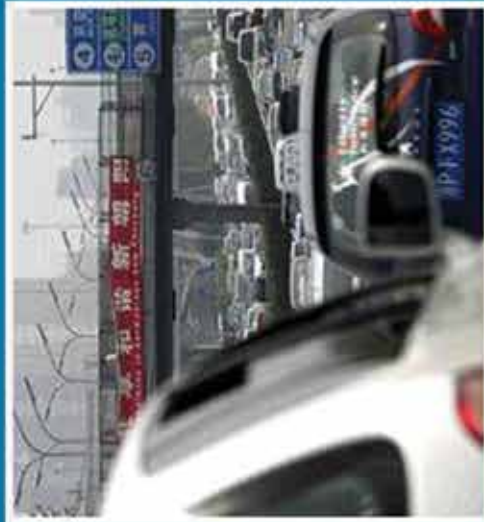


- IBM Proposition, Products, Services & Solutions offered
- Key Client References





## Cities growth is stressing Transportation Infrastructures ...



People all over the world travel approximately 30 billion miles per year. By 2050, that figure will grow to over 150 billion miles.

**More travel**



Over the next 30 years the number of vehicles will double to over 2 billion.

**More cars**



In the next 20 years, worldwide freight transportation will increase over 60%.

**More freight**



**...With significant impact to cities and its citizens**



On a global basis, congestion costs from travel delay and wasted fuel exceed \$ 250B+

**More traffic jams**



On an average travelers incur traffic delays in excess of 50 hours per year.

**More delays**



Countries and regions are losing an estimated 1.5% of their GDP / GRP due to traffic congestion.

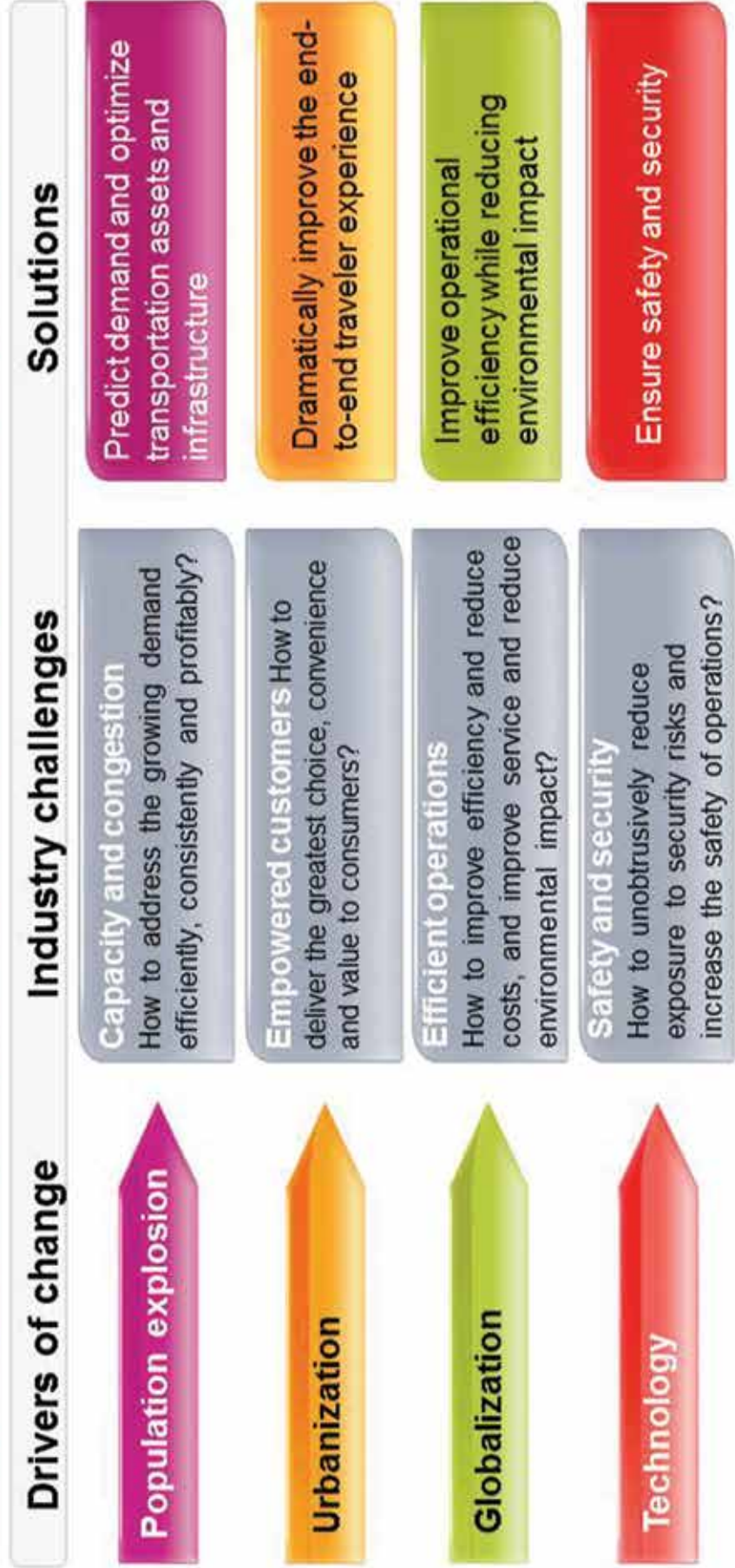
**More money lost**





## Cities Critical Transportation Issues

The transport ecosystem is confronted with four critical global issues, which are creating a specific set of challenges for transport agencies:







## Smarter Cities paves the way for Smarter Transportation

Cities can infuse intelligence into their entire transportation system, improving drivers' commutes, giving better information to city planners, increasing public transportation use and business productivity, and raising citizens' quality of life



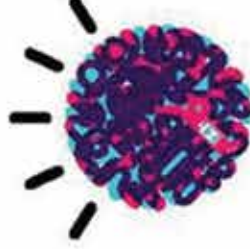
### INSTRUMENTED

Smarter transportation ecosystems are able to track traffic from source to destination, monitor conditions in real time and instantly identify faults and inefficiencies across assets and infrastructure



### INTERCONNECTED

Smarter connections give customers access to continuously updated information, travel choices and shipment options, with instant notification of any irregularities in the transport process

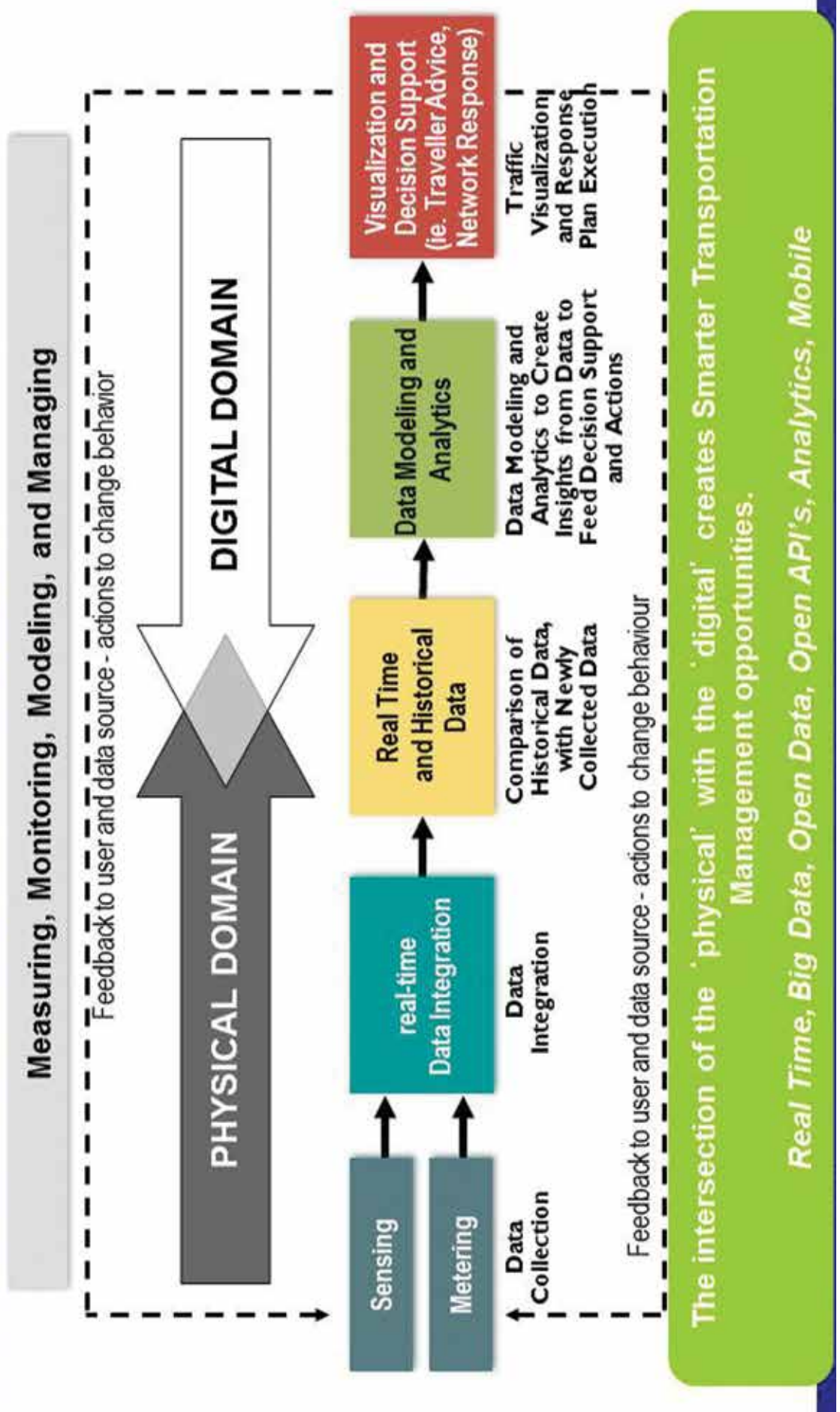


### INTELLIGENT

Smarter, real-time data is applied to dynamically adjust conditions, align congestion toll pricing with demand, take necessary security measures and make decisions based on environmental impact



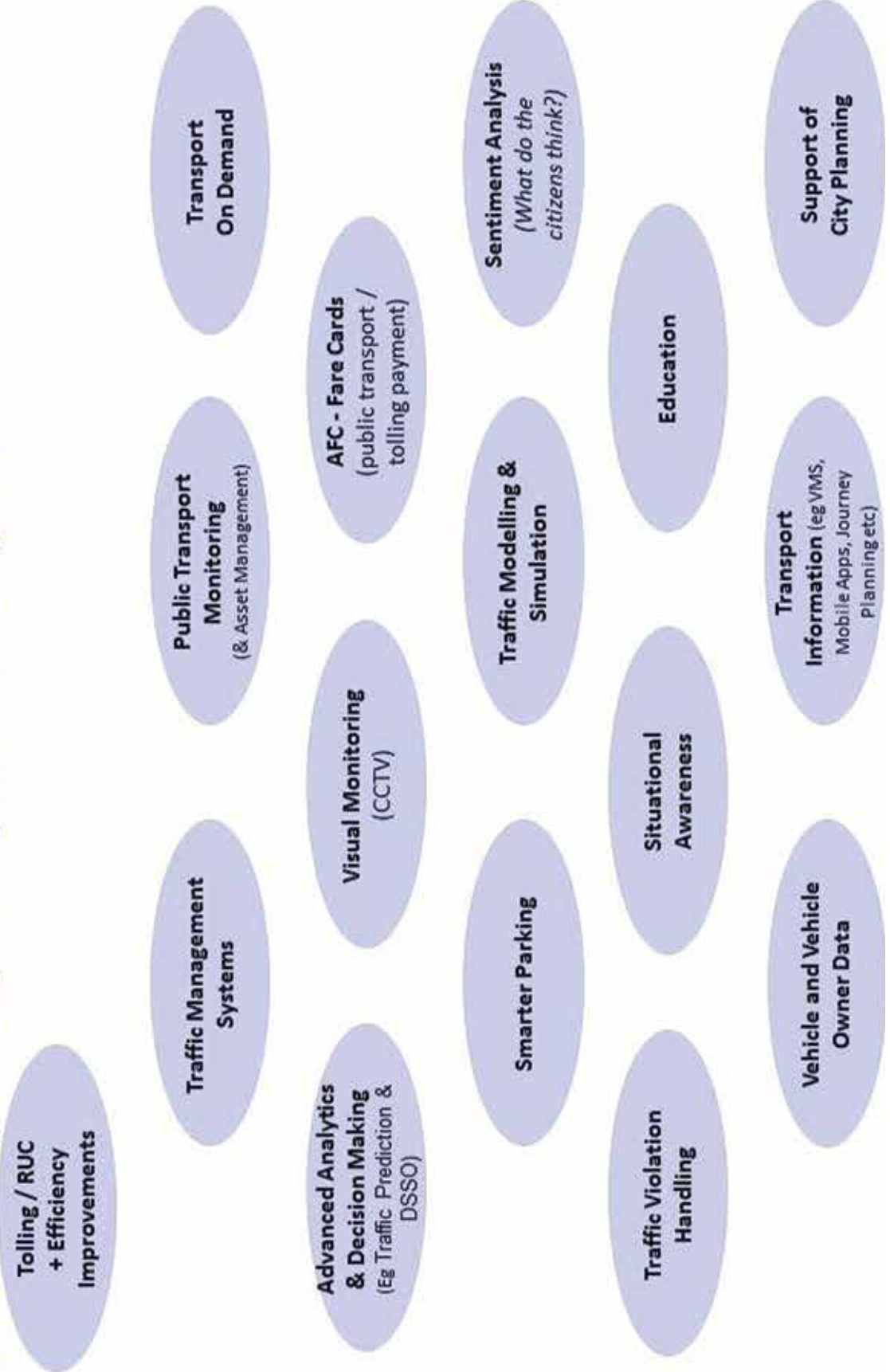
## Smarter is a result of Physical meeting Digital







## IBM has Many Transport Capabilities & Experience







# IBM Assets

## Transportation Data Gateway

- Standardize multi-source traffic data
- Identify false data, abnormal data, unreliable data and missing data
- Support different traffic data interfaces, including MQ,FTP,ODBC and DLL

## Road Usage Charging System



## Mobility Service Platform



- Location-based traffic information management framework
- Route planning, traffic alert, traffic prediction and parking reservation

## GPS Platform Accelerator



- Usage-based road charging solution
- Support flexible charging schemes: zone, time, distance, place and emission level



## Enforcement Evidence process

- Collect evidence data
- Perform compliance check;
- Detect potential fraud
- Generate enforcement cases
- Keep tracking of cases



## Transportation information portal

- GIS based map to visualize traffic network
- Road and zone navigation
- Key traffic message

## Transportation Information Warehouse and Analysis Tool



## Transportation Management Console



- GIS based map to visualize traffic network
- Real-time dashboards to show the traffic KPIs
- Decision making services
- Execute the response plan





# IBM's offering portfolio encompasses a wide range of solutions

## 1 Prepare for Smarter Transportation

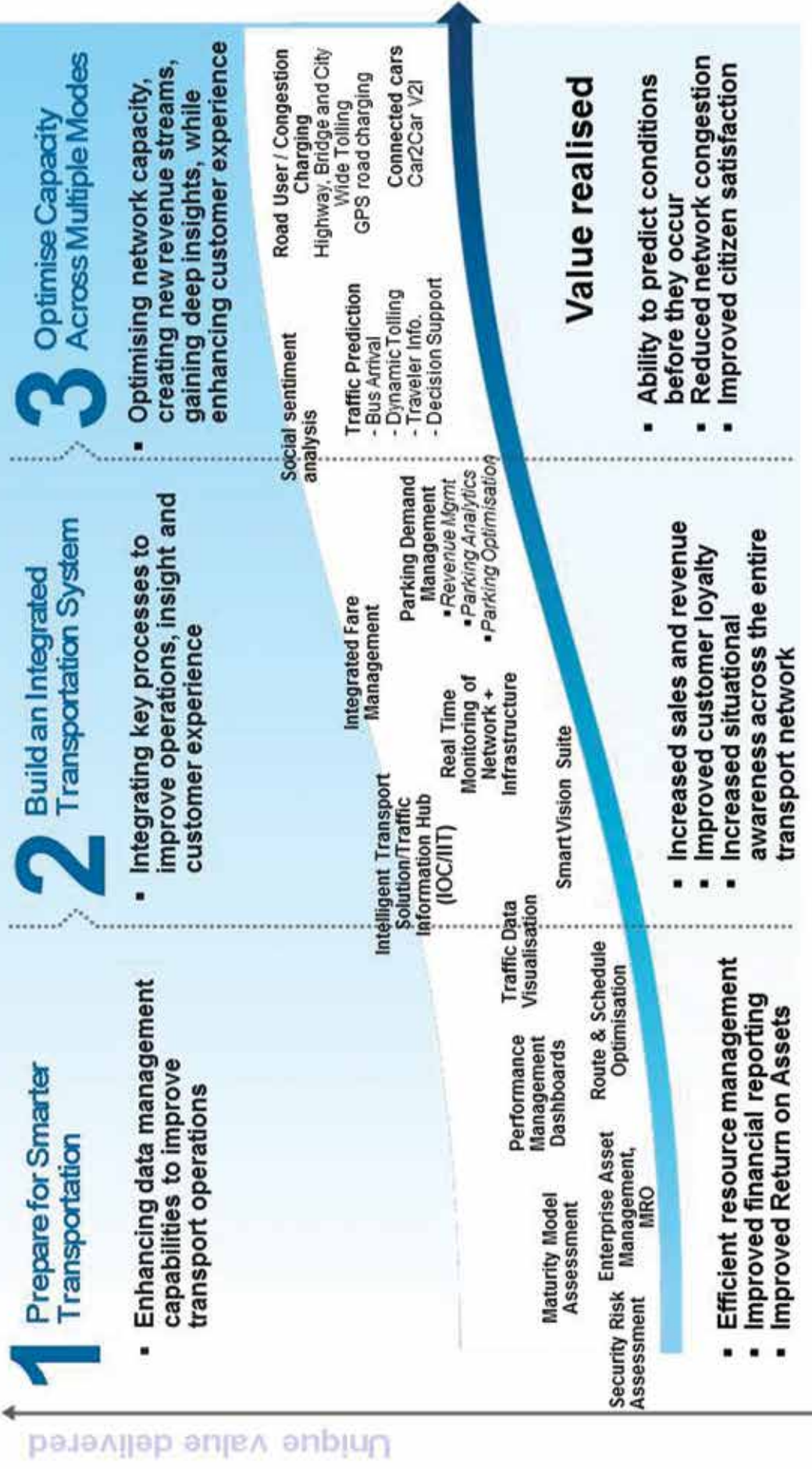
- Enhancing data management capabilities to improve transport operations

## 2 Build an Integrated Transportation System

- Integrating key processes to improve operations, insight and customer experience

## 3 Optimise Capacity Across Multiple Modes

- Optimising network capacity, creating new revenue streams, gaining deep insights, while enhancing customer experience







An example of how we create value for a city....







## Example : The Traffic Challenge in Dubai

- **The 2020 EXPO in Dubai**
- Traffic volumes continue to increase
- The city network is near capacity – congestion occurs regularly in many places
- Building new roads is not the answer as the geography and the historic city limits options
- Public transport is well used (bus, metro / light rail, etc.)
- Some road toll based reduction of congestion - but increasing traffic
- Heavy vehicles are kept out of traffic for key times of the day
- Road accidents and fatality is high
- More toll points and Improvement vehicle speeds
- Plans to build new suburbs and sky scrapers
- Possible new airport terminals
  
- Bringing millions Builders & Visitors - construction and preparation will slowdown traffic





## Discuss “IBM Multimodal Transportation Maturity Model Benchmarking”

	Level 1 Site	Level 2 Citywide	Level 3 Partially Integrated	Level 4 Multimodal Integrated	Level 5 Multimodal Optimized
<b>Planning</b>	Functional Area Planning (single mode)	Region-based Planning (single mode)	Integrated a citywide planning (single mode)	Multi-modal planning	Integrated regional multimodal planning
<b>Performance Measurement</b>	Minimal	Defined metrics per mode	Unified multimodal performance metrics	Shared multimodal performance metrics	Continuous system-wide performance measurement
<b>Customer Management</b>	Minimal capability, no customer accounts	Customer accounts managed separately for each system mode	Multi-channel account interaction per mode	Unified multimodal customer accounts	Integrated multimodal incentives to optimize multimodal use
<b>Data Collection</b>	Limited or Manual Input	Real-time data for major modes	Real-time data for major modes using multiple channels	Real-time coverage for major corridors, all significant modes	System-wide real-time data collection across all modes
<b>Data Integration</b>	Limited	Real-time data for major modes	2-way system integration	2-way system integration	Extended integration
<b>Analytics</b>	Ad-hoc analysis	Forecasting and analytics	Historical analysis	Detailed analysis in real-time	Multi-modal analysis in real-time
<b>Payment Methods</b>	Manual Cash Collection	Automated Payments	Electronic Payments	Unified multimodal payments	Multimodal, multi-media (fare cards, cell phones, etc)
<b>Network Ops. Response</b>	Ad-Hoc, Single Mode	Centralized, Single Mode	Automated, Multi-Modal	Unified, Multimodal	Multimodal Real-time Optimized
<b>Incident Management</b>	Manual detection, response and recovery	Manual detection, coordinated response, manual recovery	Automated detection, coordinated response, automatic recovery	Automated pre-planned multimodal recovery plans	Dynamic multimodal recovery plans based on real-time data
<b>Demand Management</b>	Individual static fare plans	Individual static fare plans	Individual static fare plans with a holistic view	Dynamic pricing	Multimodal dynamic pricing
<b>Traveler Information</b>	Static information	Static information	Multi-channel trip information	Location-based, on-journey multimodal information	Location-based, multimodal proactive re-routing

Multimodal Network Management Maturity Model version 1.1

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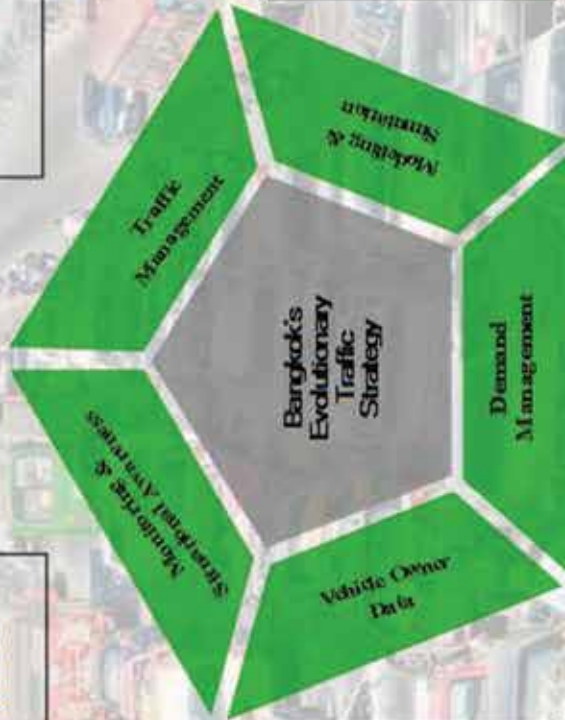




## We deliver Real & Quantifiable Benefits

Effective monitoring and situational awareness can **improve incident response times by 80%** and provide up to **90% accuracy** in traffic volume data and reduced labour costs in traffic counting.

Pro-active traffic management can deliver a **28% reduction in accidents** whilst increasing capacity by **27%**. Incident duration can be reduced by up to **70%**.



Transforming paper based systems to electronic on-line services can drive a **30% reduction in the cost of license renewals** whilst improving data accuracy with typically **60%** of customers moving to on-line services.

On-line modelling & simulation integrated into adaptive signal control can deliver a **40% reduction in delays** across the city.

Moving to Free Flow tolling at barriers can improve traffic throughput by **300% to 700%** (depending on technology) whilst reducing the cost of operations. Area based zone charging can **reduce peak traffic volumes by 45 per cent**, with average road speeds increasing by about **20%**. This improvement can drive a **58% reduction** in delays and a **10% reduction** in CO2 emissions

**Work together to develop a client proposal around a set of potential benefits**





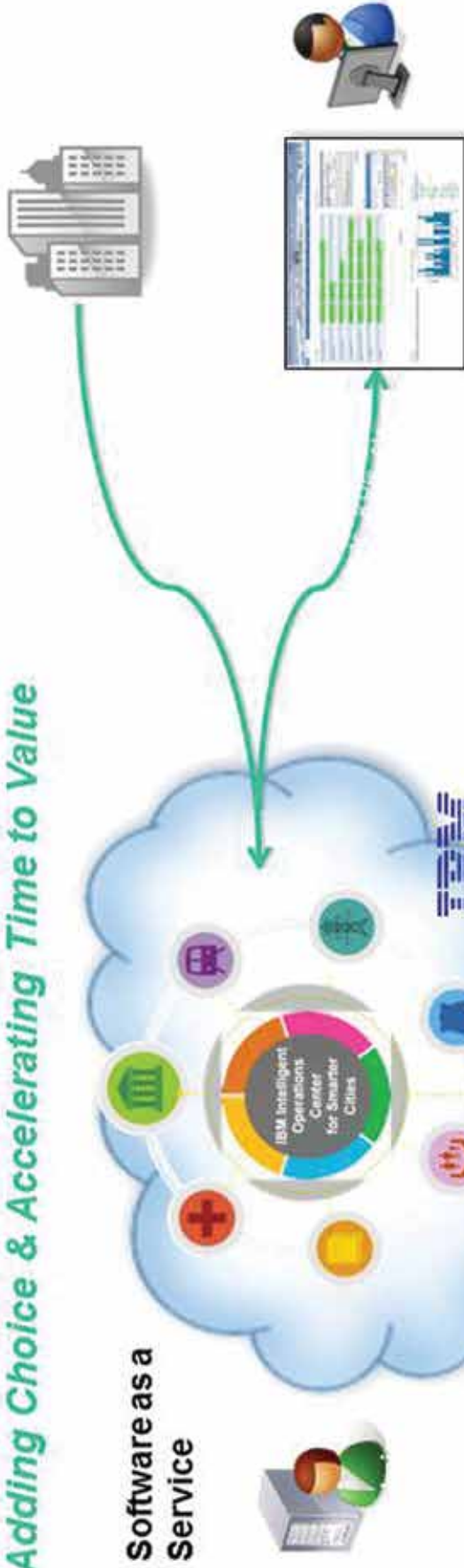








## Cloud Delivery of Smarter City Solutions Adding Choice & Accelerating Time to Value



### Software as a Service

#### Terms of Use

- Minimum 1 year, Maximum 5 year subscription
- Minimum 5 concurrent users, Maximum 200
- Each customer gets dedicated environment
- On-boarding within 20 business days of signing contract
- Same functionality as on-premise (workflows requires separate hosting agreement for Tivoli Live)
- Service Level Objective of 99.5% availability (outside maintenance windows)

#### Customer Benefits

- No up-front capital expense for hardware or software licenses
- Start small and grow as needed
- Upgrades included as long as service is current
- KPIs, workflows, dashboards fully customizable
- Hosted on IBM SmartCloud, managed by IBM SSG admins (backups, disaster recovery, manage availability)
- Can choose monthly, quarterly or annual billing





## Change 1) A Technology Enabled Transition is underway

\* ITS: Intelligent Transport Systems

Traditional ITS\* investments have focused more on knowing the state of the transportation network so clients can react to the situation.

New ITS capabilities that focus more on helping them anticipate what is likely to happen so they can avoid the likely congestion situations.

IBM can deliver efficiency improvements in the traditional environment as well as providing next generation components



# INGERSOLL RAND INDIA

Plot No 35, KIADB Industrial Area, Bidadi, Bengaluru – 562109  
www.ingersollrand.co.in



Business Description	Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence	
		Power	Renewables Generation	Smart Grid											
<p><b>Business Description</b></p> <p>Ingersoll Rand advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands-including Club Cap®, Ingersoll Rand® Thermo Kings® and Trane®-work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. Ingersoll Rand products range from complete compressed air systems, tools and pumps to material and fluid handling systems. The diverse and innovative products, services and solutions enhance our customers' energy efficiency, productivity and operations. Understanding our customer's specific needs is what shapes our ability to offer the right products and services. Ingersoll Rand's Climate and Industrial businesses focus on providing reliable, energy efficient and sustainable solutions to help customers address energy consumption and improve productivity. We are a global business committed to a world of sustainable progress and enduring results.</p>	System Integration for Large projects	✓		✓			✓								
	Functional and Technical Architecture for large projects	✓		✓											
	Consulting programs and project management				✓			✓			✓				
<p><b>Business Model</b></p> <p>We provide products, solutions and services to small, medium and large enterprises across private and public sectors in the areas of HVAC, Reefer transportation, tools and air compressors for industries across verticals such as Hospitality, Pharma, F&amp;B, Transport, Power, ITES, Auto etc.</p>	Social Inclusiveness														
	Governance & Delivery Programs														
	Data Analytics & Financial Services				✓										
<p><b>Proposition for Infrastructure projects/Smart Cities</b></p>	Product	Oil-free Air Compressor, Centrifugal Chillers, Absorption Chillers, Rotary Chillers, Scroll Chillers, Air Handlers, Bus Refrigeration Products, Transport Solution Products, Commercial Refrigeration Products, Process Refrigerators, Industrial Refrigeration Products, Residential Air Conditioning Centrifugal air compressor Blowers													
	Solutions	Parts & Service Products, Building Management Systems, Remote Monitoring of Energy usage & Temperature													

Key Infrastructure Clients		Key Financials	
Key Power Generating Enterprises Hospitality & Retail Sector Logistics Companies Products for Food Preservation and Storage Key Manufacturing Enterprises		Turnover	not in the public domain
		Proposed Investments	not in the public domain

Proven experience / case study	
Multiple power plant customer locations across India	
Attached case studies	

# JACOBS ENGINEERING GROUP (JACOBS)



**Business Description**  
 Jacobs Engineering Group (Jacobs) is a publicly held corporation and one of the world's largest and most diverse providers of planning, architectural, and engineering services.

**Business Model**  
 Jacobs is structured around four business lines: Aerospace & Technology, Buildings & Infrastructure, Industrial, and Petroleum & Chemicals.

**Proposition for Infrastructure projects/Smart Cities**

Product	✓
Services	✓
Solutions	✓

**Key Infrastructure Clients**  
 Jacobs clientele include major public and private sector organizations, providing services for both international and domestic projects

Core Competencies	Energy			Smart Transportation	Logistics	Aviation	ICT & IT Enabled Services	Disaster Management	Safety, Surveillance & Critical Infrastr Security	Public Health	Water Treatment	Waste Management
	Power	Renewables Generation	Smart Grid									
System Integration for Large projects				✓		✓					✓	✓
Functional and Technical Architecture for large projects				✓						✓	✓	✓
Consulting programs and project management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Social Inclusiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance & Delivery Programs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Data Analytics & Financial Services												

**Proven experience / case study**  
 Denver Advanced Transportation and Congestion Management Technologies Deployment(ATCMTD) program, New York City Economic Development Corporation Freight Efficiency Program, Vancouver British Columbia Smart Lighting Proposal, Boston Smart Street Lighting and Smart Pole Technologies Proposal, Boston Enterprise Data Management System, Connected TMC and CV Deployment Proposal, City of Atlanta Autonomous Vehicle Demonstration Proposal

**Key Financials**

Turnover	\$10.9 billion (2016)
Proposed Investments	

## Smart City Capability

Founded in 1947, Jacobs Engineering Group Inc. (Jacobs) is a publicly held corporation and one of the world's largest and most diverse providers of planning, architectural, and engineering services.

Jacobs has maintained a presence in India for more than fifty years across infrastructure, hydrocarbon and industrial sectors. A staff of more than 4,000 technical resources across six established offices in Baroda, Bangalore, Delhi, Kolkata, Mumbai, and Pune provide clients with solutions across transportation, water resources, environment, buildings, hydrocarbon, and industrial projects.

This provides us with a very clear understanding of how projects are conceptualized and implemented in addition to understanding the work culture and ethos of various public and private clients. Our service offerings include project conceptualization and basic engineering; detailed design and engineering; procurement support; project management and construction supervision; and inspection testing and commissioning.



2010 Commonwealth Games: Architectural and Engineering Services for Jawahar Lal Nehru Stadium, Delhi

With a global reach back culture, all projects being delivered in India are backed by expertise located across various Jacobs offices worldwide, allowing us to implement latest engineering technologies and best practices to projects undertaken in India.

In India, staff resources are comprised of technical experts across urban planning and development; architecture; municipal services and wet utilities; transportation; and industrial development. Additionally, our India resources work with teams and offices across the Americas, APAC, UK, Europe, and the Middle East providing globally integrated delivery services for projects outside of India emphasizing a truly integrated way of working. This enables us to strengthen and train our Indian staff providing competitive delivery and add value to our projects and clients.

**A total of ₹980 billion (\$15 billion USD) has been approved for development of 100 smart cities and the rejuvenation of 500 others.**

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Jacobs India is the Centre of Excellence for the Buildings Information Modeling (BIM), enabling changes in planning, design and managing of infrastructure, utilities and buildings.

The Jacobs team is actively involved in various similar lighting, fiber, and smart city programs around the world. This experience ensures that technical objectives are addressed and a vision is created along with input from stakeholders.

## Our Expertise

At Jacobs, we believe that everyone – regardless of age, income, education, and/or disability – should benefit from living in a city that has better access to goods and services in a way that is safe, efficient, and affordable. With our broad capability, strong and cohesive team, and commitment to smart city concepts, we know how to implement smart city programs that achieve any desired vision.

Jacobs boasts the capacity to implement city-wide, cloud-based Enterprise Data Management (EDM) Ecosystems that serve as ‘smart engines’ to continuously operate on an tower network (including fiber), serving public safety hotspots, street light poles, right-of-way access, in addition to a wide array of city public works entities. This EDM Ecosystem solution is infinitely scalable to accommodate all requirements, thereby having the capacity to support future city-driven smart city technology solutions.

## Program Management – Smart Cities

Jacobs can provide the following smart city service offerings:

1. Program management services, including infrastructure and building asset programs
2. Smart city partnership development, including consultants, research & development (R&D) institutions, academics, and owners’ representatives
3. Full comprehensive Internet of Things (IoT) standards and programs

## Our company at a glance

**1947**

Founded by  
Joseph J. Jacobs



Headquartered  
in Dallas, Texas

**54,000**

Employees

**230+**

Locations

**\$10.9**

Billion 2016 Revenues

**\$7.79**

Billion 2016 Client Savings

Jacobs has a global presence and is structured around four business line: Aerospace & Technology, Buildings & Infrastructure, Industrial, and Petroleum & Chemicals.

**“The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities.”**

-MINISTRY OF URBAN DEVELOPMENT, GOVERNMENT OF INDIA

## Specialized Smart City Capacity

Transportation & Mobility Programs	Water & Wastewater Management Programs
Sustainability Programs	Enterprise Data Management Ecosystems
Education & Healthcare Programs	Smart Street Lighting and Smart Pole Technology
Microgrids and Smart Grids	Full Service Cybersecurity Programs
Safety Programs	Manufacturing
Financing Model Development	Telecommunications Infrastructure Solutions
Financial Technology Hub Development	Refineries

### Why Smart Cities?

Cities around the world are facing challenges – rapid population growth, traffic congestion, aging roads and bridges, pockets of entrenched poverty, sub-optimal air quality, and uneven citizen access to resources. Infrastructure improvements are a constant focus for cities because they are essential to assuring our collective future, but infrastructure improvements alone are not enough.

Cities need new ideas, approaches, partnerships and solutions that can get the most out of infrastructure and get ‘smarter’ by deploying technology solutions that improve safety, enhance mobility, and address the detrimental impacts of climate change, improving inflows and outflows of goods, services, finance, talent, and data.

Smart cities are innovative, groundbreaking, and visionary solutions to city-driven problems ranging from transportation and mobility to water usage and air quality. They are efficient, mobile, sustainable, healthy, and work to link technology with multiple facets of everyday life as a means to defragment city operations introducing previously unrealized efficiencies that benefit municipalities and residents alike.

### Smart City Success Stories

**DENVER** - Jacobs led the City and County of Denver’s response to the United States Department of Transportation (USDOT) Smart Cities Challenge. Denver was selected as one of seven national finalists out of 78 cities that applied across the country. Denver is coordinating with Jacobs on a follow-on grant awarded through the Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) program to move forward with its vision for a smarter, more mobile city by deploying short-range communication (DSRC) based connected vehicle technology, implementing a connected freight solution thereby making businesses more efficient, and installing automated pedestrian detection technology at high-risk mid-block bike and pedestrian crossings. Denver is also looking for funds to develop a mobility marketplace and universal payment platform; manage an electric vehicle adoption and grid de-carbonization program; and create an EDM Ecosystem.

**NEW YORK CITY** - New York City’s Economic Development Council (NYCEDC) awarded Jacobs an engineering on-call contract with a special interest in freight efficiency technologies, similar to Denver’s ATCMTD program. NYC is home to three federally designated high priority corridors that either pass through the City or connect NYC to other economic centers in the region. Freight movement is closely connected to the health of the City’s economy and the transportation system through the region. New York City is the largest city (in terms of population) in the country, with more growth expected over the next decade. As significant highway expansion is unlikely, congestion will continue to be a challenge for freight movement.

## Smart City Focus Areas

### **Transportation & Mobility Programs**

Smart transit stations, corridors, parking, and vehicles can all be enhanced through technology. Smart transit stations provide passengers travel information including transit service; bicycle, vehicle, and ride sharing programs; and parking availability. These stations may have real time data on transit arrival, departure, and wait times in addition to current news and events across the city.

Smart corridors offer improved mobility, reduced emissions, and enhanced safety throughout the city in which they are implemented. Some technologies that can be used include dedicated transit lanes, transit signal priority, pedestrian detection technology, enhanced preemption for transit, and infrastructure that supports deployment of vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and/or vehicle-to-device (V2X) communication technology.

Further efficiencies are realized through the deployment of autonomous vehicles, the electrification of fleet vehicles, improving electric vehicle infrastructure, and connected vehicles.

### **Disaster Management**

City resilience and emergency response systems are crucial to any city in response to a wide variety of natural and manmade disasters, including terrorism and climate change. Transportation, utility, and communication infrastructure elements play an especially pivotal role in disaster response and management. Due to increasing technological capabilities, cities can anticipate, respond to, and recover from disasters more efficiently.

### **Environment & Sustainability**

Buildings, including airport terminals, train stations, office buildings, among others can be outfitted with smart building technology to monitor energy use, optimize how space is utilized, and minimize environmental impacts. Smart buildings offer massive potential cost-savings and increases in inhabitant comfort.

### **Utilities**

Smart street lighting provides a cost-efficient method to enhance the city's infrastructure. These poles can be outfitted with various sensor technologies including including Wi-Fi hotspots and air quality monitoring.

City water supplies and treatment facilities can be outfitted with water quality, monitoring, and usage sensors to ensure a reliable, safe, and clean drinking supply.

### **City Services**

Sensor technology can improve public safety through cameras, emergency call stations, gunshot detection sensors, and other monitoring capabilities.

Waste management can be optimized through outfitting trash receptacles with sensors to alert the City to their capacity statuses. The technology can be used to make trash collection and manpower allocation more efficient.

### **Jobs, Workforce, & Education**

AN EDM would unite all information sent by and received from smart sensors throughout the community. In turn, data would be available to citizens and businesses to encourage innovation, crowdsourcing, and job growth throughout the City.



### Business Description

One of the leading infrastructure advisory practices in India. Working with around 14 central departments and ministries. Reach across 28 states in India

### Business Model

KPMG has an integrated offering: from strategy and policy advisory to project execution, asset operations and transactions

### Proposition for Infrastructure projects/Smart Cities

Product

Services

Solutions



### Key Infrastructure Clients

Ministry of Urban Development  
National Crime and Records Bureau  
Government of Gujarat  
Government of Punjab  
Ministry of Maharashtra  
Ministry of Shipping  
Ministry of Coal

Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid										
System Integration for Large projects													
Functional and Technical Architecture for large projects													
Consulting programs and project management	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
Social Inclusiveness													
Governance & Delivery Programs	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
Data Analytics & Financial Services													
Design and manufacture of critical motion control components													
Sub system Integration capability													

### Proven experience / case study

This is available in the PDF document submitted

### Key Financials

Turnover  
Proposed Investments  
Global revenue of KPMG is USD 23.42 billion in 2013

# THE LOUIS BERGER GROUP

Plot No.3, 5th Floor, Tower B, Surinder Jakhar Bhavan (IFFCO), Sector 32 Gurgaon - 122001  
www.louisberger.com



Louis Berger

Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid										
System Integration for Large projects													
Functional and Technical Architecture for large projects													
Consulting programs and project management	✓	✓			✓				✓		✓	✓	
Social Inclusiveness													
Governance & Delivery Programs													
Data Analytics & Financial Services													
Design and manufacture of critical motion control components													
Sub system Integration capability													

**Business Description**  
The Louis Berger Group is an internationally recognized consulting firm that provides engineering, architecture, program and construction management, environmental planning and science, and economic development services. For nearly 60 years, we have been a devoted and trusted partner to U.S. federal, state, and local government agencies; national, provincial, and local governments; multilateral institutions; and commercial industry. To this diverse client base we bring strategic vision and an entrepreneurial spirit, developing innovative solutions to the world's most challenging problems.

**Business Model**  
Consultancy service for the following sectors:  
Buildings & Facilities Development  
Economics  
Energy  
Environment  
Public Administration  
Reconstruction & Recovery  
Transportation  
Water

**Proposition for Infrastructure projects/Smart Cities**

Product	
Services	✓
Solutions	

**Key Infrastructure Clients**  
Attached seperately

Proven experience / case study	
Turnover	Average turnover of last 3 years: USD\$ 551,965,469
Proposed Investments	

Key Financials	
Turnover	Average turnover of last 3 years: USD\$ 551,965,469
Proposed Investments	

# MOOG TECHNOLOGY CENTRE

Plots 1,2, & 3, Electronic City, Bangalore - 560100



Business Description	Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
		Power	Renewables Generation	Smart Grid										
Design, Manufacture and Integration of precision motion control products and systems	System Integration for Large projects													
	Functional and Technical Architecture for large projects													
Business Model	Consulting programs and project management													
	Social Inclusiveness													
Proposition for Infrastructure projects/Smart Cities	Governance & Delivery Programs													
	Data Analytics & Financial Services													
	Actuators, Controller, Manifold blocks, Feedback devices, HPU etc	✓	✓											
Services	Integration capability, Project Management expertise	✓												
Solutions														
Key Infrastructure Clients		BHEL, Triveni, SAIL Plants, Jindal Group, METRO Rail, RDSO												

## Proven experience / case study

Design and Supply of actuators to BHEL for Steam and Gas Turbines  
 Design and Supply of actuators to Triveni Turbines for Steam turbine  
 Supply of driving simulators to train loco and metro drivers  
 Design, Supply and Integration of Test rig to RDSO for testing of Railway Wagon

## Key Financials

Turnover  
 Proposed Investments



# MOTOROLA SOLUTIONS



Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Command/Control Room
	Power	Renewables Generation	Smart Grid								
System Integration for Large projects			✓	✓			✓				✓
Functional and Technical Architecture for large projects			✓	✓			✓				✓
Consulting programs and project management			✓	✓			✓				✓
Social Inclusiveness											
Governance & Delivery Programs			✓	✓			✓				✓
Data Analytics & Financial Services			✓	✓			✓				✓
Technology											

**Business Description**  
 Motorola Solutions is the premiere technology innovator, solutions and service provider for Safer Cities, mobilizing secure communications to safeguard the security, peace and stability for an enduring foundation of industrial and economic development because a Smart City is a Safer City. Motorola Solutions is the world's largest provider of mission critical communications for public safety, national security and commercial operations. In radio and broadband communications we are the number one leader across all predominant technologies, Project 25, TETRA, DMR and Public Safety LTE. We maintain the leading market share in every region of the world serving over 100 thousand customers in over 100 countries.

**Business Model**  
 Motorola is the largest supplier of mission critical radio communication and command/control solution. With more than 25 operational systems in India, it has the largest deployed customer base of digital trunking radio systems across all predominant technologies i.e. APCO P25, TETRA and DMR. From Sales to System Design Engineering to System Integration & Project rollout to post deployment Services, Maintenance & Repair, Motorola's strong local presence enables it to respond immediately while serving its customer needs

**Proposition for Infrastructure projects/Smart Cities**

Product	✓
Services	✓
Solutions	✓

**Key Infrastructure Clients**  
 Transportation - Metros, Airports, Sea Ports  
 Public Safety/Police  
 Paramilitary & Defence  
 Oil & Gas - Refineries, Pipelines etc  
 Utility - Steel Plants, Mines

**Proven experience / case study**  
 Over 25 digital radio trunking systems deployed across various verticals like police, metros, airports, refineries in the country

**Key Financials**

Turnover	
Proposed Investments	



**MOTOROLA SOLUTIONS**

# A SMART CITY IS A SAFE CITY

BUILDING THE FOUNDATION OF SAFER CITIES, THRIVING COMMUNITIES FOR INDIA

**INDIA'S SMART CITIES MISSION PROMISES TO BE ONE OF THE MOST AMBITIOUS AND TRANSFORMATIVE URBAN RENEWAL AND SERVICE INFRASTRUCTURE MODERNISATION PROJECTS ON THE PLANET.**

Ultimately, beyond the institutional, physical, social and economic development initiatives, Smart City leaders align to one clear focus: to help our cities become places where people and businesses want to establish themselves. It is necessarily understood that a chief underpinning for vitalising India's cities rests on a foundation of public safety and security performance. Safeguarding the peace, security and stability necessary for citywide social, industrial and economic development.

**KEY SUCCESS CRITERIA  
MEASURING THE  
PERFORMANCE AND  
CIVIC PROGRESS  
TOWARD SMART CITIES  
ACHIEVEMENT ARE HIGHLY  
CORRELATED TO SAFE  
CITIES PERFORMANCE.  
EXAMPLES INCLUDE:**

- **Intelligent transportation solutions**  
maintain operations continuity and dynamic route management in the presence of faults, attacks or disasters.
- **Critical infrastructure assuredness**  
of city assets and systems; ability for airports, seaports, water, roads and utilities to withstand and recover from all hazards.
- **IT connectivity and E-Governance**  
manage information security compliance and cybersecurity protections in a mobility environment to sustain integrity of sensitive operational data.
- **Planned special civic events**  
managed with people movement modelling and prediction, border management and security throughout the reach of city hotels, stadiums, airports and transit.
- **Citizen participatory solutions**  
optimise emergency and service call intake, response times and trends, crowdsourcing intelligence from citizen smartphone "sensors".

The high dependency on public safety capability for delivering the span of Smart City performance metrics guides a driving need for innovations enabling integration, interoperability and convergence of critical public safety and service solutions with the city infrastructure.

Motorola Solutions understands that within the information flowing between citizens, responders, and city agencies is the intelligence that builds Safer Cities. The greatest advantage for our government organisations is in harnessing that information - from cameras, sensors, city records, utilities, social media feeds - synthesise it to find patterns and make smart decisions, and then mobilise intelligence securely and instantly to the teams who need it the most. When we integrate all these various inputs into a single unified stream where data, voice and video co-exist and public safety inputs are married to information flowing from throughout the city, we move from dispatching units to react at a moment's notice to communications centres that can better anticipate, forecast and predict.

**IT'S THE TECHNOLOGY AND  
EXPERTISE THAT TURNS  
NOISE INTO INFORMATION,  
INFORMATION INTO  
INTELLIGENCE, AND  
INTELLIGENCE INTO SAFETY  
BECAUSE A SMART CITY IS  
A SAFE CITY.**



**MOTOROLA SOLUTIONS IS THE PREMIER TECHNOLOGY INNOVATOR, SOLUTIONS AND SERVICE PROVIDER FOR SAFE CITIES. WE MOBILISE SECURE COMMUNICATIONS TO SAFEGUARD THE SECURITY, PEACE AND STABILITY FOR AN ENDURING FOUNDATION OF INDUSTRIAL AND ECONOMIC DEVELOPMENT.**

Motorola Solutions is the world's largest pure play company serving mission critical secured communications with a singular focus. We are motivated by a passion to innovate and an unceasing commitment to advance the way public safety and national security agencies connect. Our solutions enable governments to harness the information that surrounds us, deliver one real-time operating picture, extract actionable intelligence and then instantly mobilise that intelligence for better decision making and better outcomes.

The company's core business demonstrates strong operating leverage, cash flow generation, and sustained differentiation and value creation. Motorola Solutions is a highly profitable and successful business with market leadership in our core radio solutions, Public Safety LTE broadband, investments driving intelligence led operations, and very strong emphasis on services including complex systems integration, application enablement and managed services. We are incredibly privileged to maintain the strength of trusted relationships with governments, public safety and national security agencies around the world. This defines our purpose, "helping people be their best in the moments that matter".

70% of our revenue comes from government contracts serving public safety emergency response operations, national security and military applications. An additional 30% of our revenue comes from adjacencies in commercial and industrial verticals where hazardous environments and operational workflows maintain very similar requirements to emergency communications including Oil and Gas, Transportation, Airports, Petrochemical, Utilities, Mining.

At Motorola Solutions, we understand that integration of these products and services into end-to-end solutions requires a collaborative approach. Our comprehensive network of world-class partners allows us to tailor those solutions to the specific needs of customers. Designed with the needs of today and tomorrow in mind, our solutions help users focus on their tasks, and not worry about their technology. Through a combination of industry-leading products and services, we are able to help our customers solve today's problems while helping them be ready for what's next.

## **MOTOROLA SOLUTIONS IN INDIA**

Motorola Solutions India Private Limited is a wholly owned subsidiary of Motorola Solutions Inc. and was established in 1989. Since then, Motorola Solutions has been at the forefront of delivering mission and business critical wireless communication solutions to various Government and Enterprise customers in the country. Motorola Solutions' customer base in India includes police, paramilitary, defence, transportation (metros/railways/airports/seaports), energy (mines, refineries, pipelines, petrochemical plants) and utilities (power plant/steel plants).

With more than 25 operational systems in India, we are the largest supplier of radio communication systems with the largest deployed customer base of digital trunking radio systems across all predominant technologies i.e. APCO P25, TETRA and DMR. Whether it entails critical infrastructure or city wide police communication networks, Motorola Solutions is the trusted partner for Indian customers for deploying reliable, resilient, secure radio communication systems.

Headquartered in Gurgaon, Motorola Solutions has a presence across India duly supported by offices in Bengaluru, Mumbai and Kolkata. Motorola Solutions is the only local company in its domain that provides an end-to-end solution lifecycle support to its customers through its trained and experienced support staff available within India. From sales to system design engineering to system integration and project rollout to post deployment services and repair, Motorola Solutions' strong local presence enables us to respond immediately while serving our customer needs.

## LEADERSHIP AND SCALE

Motorola Solutions is the world's largest provider of mission critical communications for public safety, national security and commercial operations. In radio and broadband communications we are the number one leader across all predominant technologies, Project 25, TETRA, DMR and Public Safety LTE. We maintain the leading market share in every region of the world. We have an installed base of over 27 million radios in over 100 countries, shipping over 5 million new devices each year and serving over 100 thousand customers. We operate 30 nationwide mission critical radio systems and maintain accountability for managing the communications depended upon by public safety organisations.

Motorola Solutions has the great privilege of being awarded the role of prime contractor for all of the largest government Public Safety LTE broadband contracts in the world. Examples of some of our large scale Public Safety LTE reference systems include Los Angeles County LA-RICS, UK Emergency Service Network, Chicago OEMC, Harris County Texas, and two nationwide Middle East implementations.

Our leading share and the volume of systems and devices we supply each year gives us the scale to invest into our core business and drive the innovation that allows us to maintain our leadership and pre-eminent market position. We invest more than 10% of the company's annual revenue in research and development of the next generation of mission-critical communication technologies and services. In radio investment alone, Motorola Solutions drives more R&D than our leading competitors combined.

We invested USD \$620 million in R&D in 2015, with over 3,000 employees engaged in R&D activities. In addition, we engage in R&D activities with joint development and manufacturing partners to further supplement our internal spend and maintain an accelerated footprint of venture capital and acquisitions.

### QUICK NUMBERS

- 2015 annual sales: USD \$5.7 billion
- 2015 research and development spend: USD \$620 million
- Customers: Over 100,000 in over 100 countries
- Employees: 14,000 in 60 countries
- Over 12,000 mission critical networks worldwide
- Global reach with a channel network of over 7,500 partners
- Thousands of patents focused on mission-critical and wireless technologies

### PRODUCTS

*\$3.7B 2015 Revenue*

- Two-Way Radios
- Radio Networks
- Integrated Command & Control
- Intelligence-Led Public Safety
- Public Safety LTE
- Smart LTE Devices
- SCADA Systems
- iDEN Networks
- Work Group Communications
- Software Applications

### SERVICES

*\$2.0B 2015 Revenue*

- Network & Application Assessments
- System Implementation
- Managed Services
- Asset Management
- Network Management
- Cyber Security Services
- Lifecycle Services
- Preventive Maintenance & Repair
- Technical Support
- Service from the Start

### STOCK SYMBOL

- NYSE: MSI

### CHAIRMAN AND CEO

- Greg Brown

### HEADQUARTERS

- 1303 East Algonquin Road Schaumburg, Illinois, USA

## WORLD'S MOST COMPREHENSIVE PORTFOLIO OF NEXT GENERATION PUBLIC SAFETY PRODUCTS, SOFTWARE AND SERVICES FOR SAFE CITIES

Motorola Solutions is driving the industry's most comprehensive plan for delivering Safe City architectures to governments around the world. Sustained, unmatched investment driven toward innovations in our mission critical architecture entirely align to support India's safe cities vision of driving transformation in public safety and national security operations through mobilising intelligence through secured, mission critical communications.

### MISSION CRITICAL RADIO AND BROADBAND COMMUNICATIONS

Motorola Solutions' state-of-the-art mission critical radio networks provide the ultra-high security and uncompromising resiliency for instant communications and guaranteed geographic coverage. Delivering advanced voice and multimedia applications to frontline personnel, communication centres and government agencies. Our mission critical radio networks extend through converged, future-ready architectures to introduce Public Safety LTE broadband capabilities. These broadband innovations are already transforming public safety operations by providing front line responders with increased situational awareness, enhanced tactical collaboration and greater in-field productivity. Based on context awareness of each individual, the systems will dynamically prioritise resources at a highly granular level following operational dimensions wholly unique to mission critical operations. When disasters strike, or a crisis forms, our radio and broadband networks will deliver the needed insurance of uncompromising availability, along with the capacity, interoperability and security required to address the new, more sophisticated threats emerging every day.

### NEXT GENERATION RESPONDER AND CONNECTED VEHICLE COMMUNICATIONS

Embracing the growing consumption of rich media content both in the field and in the communications centre, we are introducing new categories of devices and applications focusing on human computer interaction designed specific for mission critical user functions – exploring techniques such as context-aware user interfaces, industrial design, augmented reality, and immersive visualisation that perform under the most intense cognitive pressures. The entire communication system becomes context aware, bringing in a broad scope of inputs to generate a holistic understanding of the scenario, and supporting intelligent information management to proactively push the right information to the user over the right application, network, or device - at the right time - and nothing more. Next generation responder communications as well as connected vehicle technology augments the responder's existing reality and helps him better monitor his environment, gather information and be more aware. The devices and vehicles become a virtual partner at the responder's side, bringing focus to the most relevant, possibly life-saving, information.

### INTELLIGENCE LED COMMAND AND CONTROL THEATRE SOLUTIONS

Motorola Solutions' integrated command center solutions enable operations to scale instantly from local, multi-agency incident response to mass coordination across every level of government to provide one unified, real-time operational picture. With video surveillance, the power of real-time sight and predictive analytics secures critical infrastructure and high density public spaces while simultaneously integrating to create highly intelligent city-wide surveillance systems that see through cameras connecting public safety, city service, transit authorities, departments of water and aviation as well as schools, banks and retailers. By bringing automated intelligence and data analytics into the command environments, we help intelligence agencies synthesise information and interpret the mass amounts of data coming from city sources, public safety sensor networks, video surveillance feeds, citizen-generated inputs and historical records. Intelligence agencies are better prepared to anticipate threats, make intelligent predictions, offer more targeted counteractions and plan optimal strategies.



## DEFENSE-IN-DEPTH COMMUNICATIONS SECURITY FRAMEWORK

End-to-end communications security continue to be a central focus as the global cyber-crime network strengthens and expands into a sophisticated, multi-billion-dollar economy where government data becomes a growing target and countries wage cyber warfare campaigns against one another. Mobile fortifications are a critical requirement in protecting against the growth in Government directed cyber-crime.

**MOTOROLA SOLUTIONS BRINGS MILITARY-GRADE SECURITY MEASURES TO KEEP A VIGIL OVER THE COMPLEX ARRAY OF GOVERNMENT DATA CONNECTIONS AND CONFLUENCE OF ENDPOINTS AND INROADS TO DATA SOURCES. CONCENTRIC RINGS OF PROTECTION SECURE AGAINST THE NEW THREAT MATRIX.**

Sensitive communications are secured, identities protected, operational information shielded and agency data safe-housed without compromising operational agility.

## CITIZEN PARTICIPATORY GOVERNMENT AND MOBILISED E-GOVERNMENT

Smart City initiatives demand government officials are capable of harnessing the power of social media to create a more open, participatory and transparent engagement with their citizens. Smart Cities must open access to city data to drive social media innovations; guiding explorations of mobile apps that help residents submit, poll, vote and share ideas for maintaining the vibrancy of their communities.

Motorola Solutions provides the application and enablement capabilities empowering intelligence and social services agencies with tools to share information with the public, receive information, as well as actively listen to the chatter and monitor for investigative leads. Multimedia emergency and service call centre solutions enable citizens to share images, messages and video that city agencies need and fulfill the public expectation that public safety and service departments are able to use what they provide. Additionally, Motorola Solutions provides government workers powerful mobile tools for intuitive in-field operations. Purpose-built devices tether to intelligent applications for automating workflows, correlating electronic city work orders, measuring environmental analytics and leveraging historical trends and forecasts to manage the city's intelligent enterprise operations.

## VIRTUALISED, CLOUD-BASED, COMMUNICATIONS-AS-A-SERVICE

Government and public safety leaders are increasingly looking to shift from more capital-intensive customer-owned business models to increasingly operational expense-focused managed service models where a predictable, recurring fee takes the place of a large upfront spend. Motorola Solutions provides the specialised Managed Services to offload the burden of managing these complex platforms while ensuring the uncompromising, mission critical performance and operational excellence lives depend on. Centralised management dashboards provide a view into the health and well-being of the entire, system-wide communications networks and application services. Intelligent performance analytics tune into key mission critical indicators and forecast where trouble may arise well before an alarm sounds to focus proactive troubleshooting. Premium usage accounting and invoicing, from tenant-level detail to aggregated views, enable administration and management of shared network resources.



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**Business Description**  
 Oshkosh Corporation is a US \$8 billion Fortune 500 Wisconsin, U.S. based company and the world's largest manufacturer and marketer of fire & emergency vehicles, access and equipment, specialty vehicles and truck bodies for the primary markets of defense, homeland security, municipalities, industrial, undertakings, concrete placement and refuse hauling. The company's major brands - Oshkosh, JLG, Pierce, McNeilus, IMT, Frontline, Jerr-Dan, CON-E-CO and London - are considered leaders in their industries.

**Business Model**  
 Established in 1917, Oshkosh Corporation is a U.S.-based global manufacturer with manufacturing operations in eight U.S. states and in Australia, Belgium, Canada, China, France and Romania and through investments in joint ventures in Mexico and Brazil. The company currently employs approximately 12,000 people worldwide. We currently sell and service products in more than 130 countries around the globe. We market our equipment in geographic regions where the performance specifications demanded by customers either match our current vehicle configurations or present an opportunity to sell value-added features at a price premium. Our sales and service network consists of both direct branch offices and dealers to provide better access and support in key markets. Dealerships are appointed brand-by-brand on the basis of their ability to understand and serve specific markets. Most are locally owned.

**Proposition for Infrastructure projects/Smart Cities**

**Product**  
 -Fire & Emergency Vehicles  
 -Bomb Response & HazMat  
 -Command & Control Vehicles  
 -Concrete Mixers  
 -Rescue Trucks  
 -Access Equipments

**Solutions**  
 Specialty Vehicles for the applications in defense, homeland security, municipalities, industrial undertakings, concrete placement and refuse hauling

**Services**  
 Specialty Vehicles for Fire, Emergency, Homeland Security, Command & Control and Access Equipment

**Key Infrastructure Clients**  
 Large Industrial Undertakings, Industrial Complexes, Municipalities, Department of Home Affairs, City Government

Core Competencies	Energy			Smart Transportation	Telecom	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid									
System Integration for Large projects				✓				✓				
Functional and Technical Architecture for large projects												
Consulting programs and project management												
Social Inclusiveness												
Governance & Delivery Programs												
Data Analytics & Financial Services												
Design and manufacture of critical motion control components												
Sub system Integration capability												

Proven experience / case study		Key Financials	
- Supplied Aircraft Rescue and Fire Fighting ("ARFF") vehicles at Mumbai International Airport Ltd. (MIAL) & Bengal Aerotropolis, Durgapur (West Bengal) in India		Turnover	Approx. 8 billion USD
World Wide Presence in over 130 countries		Proposed Investments	

**MOVING THE WORLD AT WORK**



# OSHKOSH Corporation

**A FORTUNE 500 COMPANY**

**CONTACT:**

Mr. Yash Kansal  
Country Manager, India/SAARC  
E-Mail: [ykansal@oshkoshcorp.com](mailto:ykansal@oshkoshcorp.com)





# Company Overview

- Founded in 1917, a lead manufacturer and marketer of fire & emergency vehicles, access equipment, specialty vehicles and truck bodies for the primary markets of defense, homeland security, concrete placement, refuse hauling, large industrial undertakings, municipalities, etc.
- **Employees:** 12000+ worldwide
- **Operations:**
  - Manufacturing operations in eight U.S. states and in Australia, Belgium, Canada, China, France and Romania and through investments in joint ventures in Mexico and Brazil
  - Currently sell and service products in more than 130 countries around the globe
  - Major Sales & service offices located at New Delhi & Mumbai in India



CHARLES L. SZEWS  
Chief Executive Officer

WILSON P. JONES  
President and Chief Operating Officer

MOVING THE WORLD AT WORK







# Airport Products



AIRPORT  
PRODUCTS



Aircraft rescue  
and firefighting  
(ARFF) vehicles



Snow Trucks

MOVING THE WORLD AT WORK





# Fire & Emergency Rescue Vehicles



Ladder



Platform



Heavy Duty Rescue



Light Duty Rescue



First Responder



Industrial Pumper

**MOVING THE WORLD AT WORK**



# Homeland Security- Bomb & HazMat Response



- From scene control to explosives collection, our Bomb Response vehicles are specially designed to handle any threatening situation confidently and proficiently
- HazMat vehicles are smartly configured to efficiently store required specialized equipment: suits, over-pack drums, and decontamination equipment. Many feature laboratories for on-the-spot analysis of materials.

MOVING THE WORLD AT WORK





# Command & Control vehicles



## Mobile Command Centre



## SWAT: Law Enforcement



We deliver customized state-of-the-industry vehicles outfitted conference rooms for concise decision making, galley/restrooms, workstation/command/dispatch consoles to respond in real time with quality information and integrated with complex audio, video, RF, surveillance, and communications equipment to meet specific requirements.

**MOVING THE WORLD AT WORK**





# Access Vehicles



High-quality equipment for building supply, construction, tire service, public works, mining, railroad, rental, and propane markets around the world

**MOVING THE WORLD AT WORK**



# Mixers, Refuse Trucks & Recovery Vehicles

[Towing & Recovery vehicles](#)



Carriers

**JERR-DAN**



Wreckers



Rotators

[Mixers & Refuse Trucks](#)



Concrete Mixers



Refuse Trucks



**MOVING THE WORLD AT WORK**



# MOVING THE WORLD AT WORK



## THANK YOU!!

### CONTACT:

Mr. Yash Kansal  
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### Oshkosh India Private Limited

Unit 1&3, Grand Plaza, The Grand  
Nelson Mandela Road  
Vasant Kunj, New Delhi-110070





Business Description	Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
		Power	Renewables Generation	Smart Grid								
Manufacturer, supplier and service provider for anti-friction bearings and related power transmission products including gear boxes in India. Exporter of products and services for Timken Company's other global facilities	System Integration for Large projects	✓	✓									
	Functional and Technical Architecture for large projects	✓	✓									
	Consulting programs and project management											
	Social Inclusiveness											
	Governance & Delivery Programs											
	Data Analytics & Financial Services											
	Technology											

Key Financials	
Turnover	\$4,341.20
Proposed Investments	None

Proven experience / case study
Indian Railways, BHEL, NTPC Plants, SAIL, Coal India Ltd, long list of private sector players. Offer value added solutions like fuel-efficient bearings, low cost of replacement, productivity improvement, etc.,

**Business Description**  
Manufacturer, supplier and service provider for anti-friction bearings and related power transmission products including gear boxes in India. Exporter of products and services for Timken Company's other global facilities

**Business Model**  
Direct supplies to OEMs, Public Sector Enterprises and other private companies. Pan India distributor network to support after-market opportunity. Social responsibility thru Timken Foundation

**Proposition for Infrastructure projects/Smart Cities**

Product	System solution in mechanical
Services	power transmission equipments. Range of products and services
Solutions	

**Key Infrastructure Clients**  
Indian Railways, BHEL and Power plants, Cement Plants, Coal India and Private Mines, Steel Plants, Construction Equipment Manufacturers, Wind Gearbox manufacturer, Commercial Vehicle OEMs, etc.,

# TIMKEN

- BEARINGS
- HOUSED UNITS
- POWER TRANSMISSION SOLUTIONS
- ADVANCED SOLUTIONS
- REPAIR AND SUPPORT
- KNOWLEDGE AND SERVICES

WWW.TIMKEN.COM

# TIMKEN

PRODUCTS + SERVICES GUIDE

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets high-performance mechanical components, including bearings, gears, chain and related mechanical power transmission products and services.

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Stronger. Commitment. Stronger. Value. Stronger. Worldwide. Stronger. Together. | Stronger. By Design.

Every day, a spirit of innovation inspires ideas from Timken that contribute to a more efficient world. It motivates our world-class engineers and technologists to minimize the friction that limits productivity. And their tools include the most advanced technical resources on the planet.

Everything we say, everything we do is by design: to perpetually improve ourselves so we further strengthen those we serve. Through our focus, precision and passion for details, we produce results of lasting value.

No matter what challenge you face, call on the team at Timken to help you overcome the toughest problems. Together, there is nothing we can't improve. Together, we are stronger, by design. For more information, visit us at [www.timken.com](http://www.timken.com).

**Stronger. By Design.**





# FRICITION HAS MET ITS MATCH.

Our full range of bearings, housed units, power transmission products and advanced services is hard at work in countless industries around the world. Designed for excellence, Timken's high-performance portfolio helps your equipment run better – and boosts your profitability.

## BEARINGS

	SUMMARY	ADVANTAGES
 <p><b>TAPERED ROLLER BEARINGS</b></p>	<p>Single-, double- and four-row configurations, along with integrated assemblies to manage both radial and thrust loads in the most unforgiving conditions</p>	<ul style="list-style-type: none"> <li>• Increase power density with a smaller, lighter bearing</li> <li>• Rated among the highest in the industry for long life and low cost of ownership</li> <li>• Industry's broadest range of inch and metric sizes</li> </ul>
 <p><b>SPHERICAL ROLLER BEARINGS</b></p>	<p>Manage the challenge of high radial loads with innovations that help extend bearing life and boost reliability</p>	<ul style="list-style-type: none"> <li>• Run at consistently lower temperatures than same-size competitive bearings</li> <li>• Multiple cage designs – including a wide range of both steel and brass options</li> <li>• Optimized internal geometries deliver highest load ratings in the industry</li> </ul>
 <p><b>CYLINDRICAL ROLLER BEARINGS</b></p>	<p>Comprehensive line of single-, double- and multi-row versions helps extend equipment life and lower maintenance costs</p>	<ul style="list-style-type: none"> <li>• EMA high-performance series offers premium brass land-riding cages that reduce operating temperatures</li> <li>• ADAPT™ line combines cylindrical and spherical roller bearing designs into one easy-to-assemble, high-capacity configuration – ideal for applications with combined misalignment and axial displacement</li> </ul>
 <p><b>THRUST BEARINGS</b></p>	<p>Ideal for when axial loads meet high speeds, heavy loads or other challenging conditions</p>	<ul style="list-style-type: none"> <li>• Provide optimum performance in both standard and custom designs</li> <li>• Meet virtually any application need with cylindrical, spherical, tapered and ball types</li> </ul>
 <p><b>BALL BEARINGS</b></p>	<p>Engineered to perform in a wide range of applications, from electric motors to agricultural implements to food processing equipment</p>	<ul style="list-style-type: none"> <li>• Radial varieties tolerate relatively high-speed operation under various load conditions</li> <li>• Angular contact designs include contact angles that support both radial and axial loads</li> </ul>



## HOUSED UNITS

	SUMMARY	ADVANTAGES
 <p><b>UNT/S&amp;F PLUMMER (PILLOW) BLOCK HOUSED UNITS</b></p>	<p>Customizable design, interchangeable components and reliable spherical roller bearings provide heavy-duty performance</p>	<ul style="list-style-type: none"> <li>• Premium performance with lower operating temperatures and increased load-carrying capacity for longer bearing life</li> <li>• Easily convert from fixed to float configurations in the field</li> <li>• Easy-to-remove cap for inspections, replacement and maintenance</li> </ul>
 <p><b>SPHERICAL ROLLER BEARING SOLID BLOCK HOUSED UNITS</b></p>	<p>Cast steel housings with high-performance spherical roller bearings deliver outstanding durability in extreme conditions, including severe shock loads and vibration</p>	<ul style="list-style-type: none"> <li>• Multiple sealing options offer protection from contaminants</li> <li>• Can be mounted and aligned in 15 minutes</li> <li>• Easily convert from fixed to float configurations in the field</li> </ul>
 <p><b>TYPE I SPHERICAL ROLLER BEARING HOUSED UNITS</b></p>	<p>A new standard in performance with the highest dynamic load ratings in the industry</p>	<ul style="list-style-type: none"> <li>• Seal provides industry-leading protection against contamination</li> <li>• Optimized internal geometries help improve bearing life and performance</li> <li>• Rugged, cast-iron housing and electrostatic coating enhance corrosion resistance</li> </ul>
 <p><b>BALL BEARING HOUSED UNITS</b></p>	<p>Easy installation, multi-seal design and flexible options help support a wide range of demanding applications and conditions</p>	<ul style="list-style-type: none"> <li>• Provide advanced protection against contaminants in a robust, compact unit</li> <li>• Withstand static misalignment of +/- 3 degrees</li> <li>• Effective grease retention and reduced debris and moisture ingress help improve performance</li> </ul>

## PRECISION BEARINGS

	SUMMARY	ADVANTAGES
 <p><b>PRECISION MNV SERIES BALL BEARINGS</b></p>	<p>Ideal for ultra-high-speed applications requiring both tight tolerances and super-fine surface finishes</p>	<ul style="list-style-type: none"> <li>• Meet the highest industry standards – including ABEC 9 – in tolerance levels</li> <li>• Deliver higher yields and lower costs</li> <li>• High-performance cage designs allow for superior operation at high speeds</li> </ul>
 <p><b>PRECISION MV SERIES BALL BEARINGS</b></p>	<p>Effective control of machine tool spindles and other demanding applications, with precision up to 1 million dN</p>	<ul style="list-style-type: none"> <li>• Low vibration and heat generation for smooth operation and low noise</li> <li>• Tolerances and uniformity exceed industry standards for superior dimensional and running accuracy</li> </ul>
 <p><b>PRECISION BALL SCREW SUPPORT BEARINGS</b></p>	<p>Feature ABEC 9/ISO P2 axial running tolerances to reduce runout and deliver the highest accuracy possible for tool positioning and repeatability</p>	<ul style="list-style-type: none"> <li>• Provides preload tolerances that are among the tightest in the industry</li> <li>• Cage design permits additional balls for higher load capacity</li> <li>• Flanged and nonflanged options simplify installation</li> </ul>
 <p><b>PRECISION TAPERED ROLLER BEARINGS</b></p>	<p>Superior accuracy and control with rigorous manufacturing processes that help deliver reliable performance – every time</p>	<ul style="list-style-type: none"> <li>• Tighter manufacturing specifications resulting in greater rotational accuracy</li> <li>• Reduced tolerances on bore and outside diameter improve performance</li> <li>• High load-carrying capacity helps enhance fatigue life</li> </ul>
 <p><b>PRECISION CROSSED ROLLER BEARINGS</b></p>	<p>Combine the compactness of a single-row bearing with the stability of a two-row bearing for high rotational accuracy and rigidity in a space-saving design</p>	<ul style="list-style-type: none"> <li>• Withstands high overturning moments</li> <li>• Ideal as a table bearing for machine tools, including vertical boring and grinding machines</li> <li>• Unique design delivers lower operating temperatures and high-speed performance</li> </ul>

## POWER TRANSMISSION SOLUTIONS

	SUMMARY	ADVANTAGES
 <p><b>SEALS</b></p>	A variety of types and material options provide resistance to extreme temperatures, pressure, debris and most chemicals	<ul style="list-style-type: none"> <li>Contact and non-contact designs suit any application – with excellent sealing capability</li> <li>Durable materials offer long seal life and minimize maintenance</li> <li>Secondary seals, covers and end caps provide extra protection</li> </ul>
 <p><b>COUPLINGS</b></p>	Easy to install and require no lubrication, with a life span that matches the rotating equipment to help keep overall cost of ownership low	<ul style="list-style-type: none"> <li>Transmit the same or more torque than a gear, grid, chain or other elastomeric coupling with similar dimensions</li> <li>Easy to replace coupling insert without moving hubs – maintenance takes minutes</li> <li>Sized to fit virtually all needs, with multiple hub and shaft combinations for easy mounting</li> </ul>
 <p><b>CHAIN</b></p>	Manufactured to meet or exceed ANSI standards and excel in tough, high-performance applications	<ul style="list-style-type: none"> <li>Wide-waisted link plates help improve stress distribution for better performance</li> <li>Precision hole quality increases working load and pin retention</li> <li>Can withstand shock loads up to 50% of minimum ultimate tensile strength without premature elongation</li> </ul>
 <p><b>LUBRICANTS AND LUBRICATION SYSTEMS</b></p>	Using a choice of lubricants, delivery systems dispense precise amounts of lubricants in virtually any application, from simple, single-point needs to multi-point or progressive systems	<ul style="list-style-type: none"> <li>High-performance additives optimize consistent operation under high-temperature, high-wear and wet conditions</li> <li>Patented chain lubrication systems inject oil where it's needed for reduced wear and longer life</li> </ul>

## ADVANCED SOLUTIONS

	SUMMARY	ADVANTAGES
 <p><b>CONDITION MONITORING DEVICES</b></p>	Powerful diagnostic tools – including handheld devices and online systems – help monitor bearing condition, lubrication quality and machine vibration to increase uptime and maintenance efficiency	<ul style="list-style-type: none"> <li>Designed to detect potential bearing failure before it occurs</li> <li>Periodic or continuous monitoring increases productivity, safety and peace of mind</li> </ul>
 <p><b>ONLINE INTELLIGENCE SYSTEM</b></p>	Sophisticated monitoring platform adjusts measurement parameters to meet current conditions – no matter how extreme – and still handle fluctuations with precision	<ul style="list-style-type: none"> <li>Delivers reliable, actionable data</li> <li>Powerful signal processor and intelligent software mean fast, accurate measurements</li> <li>Handles signals between multiple units and databases</li> </ul>
 <p><b>ENCODERS AND SENSORS</b></p>	Precisely control movement in rotary equipment, from industrial, medical and robotic applications to off-highway and automotive products	<ul style="list-style-type: none"> <li>Sustain high vibration, shock and operating temperatures up to 135° C (275° F)</li> <li>Patented, customized products – with tens of millions currently in the marketplace – feature higher accuracy and reliability than traditional solutions</li> </ul>
 <p><b>COATINGS AND ENGINEERED SURFACES</b></p>	Innovative selection of hard coatings and topographical modifications for individual or combined use help boost the performance of precision components in difficult applications	<ul style="list-style-type: none"> <li>Help enhance performance and reliability in equipment with marginal lubrication or in high-debris environments</li> <li>Supports increased system durability and reduced warranty costs</li> </ul>

Our commitment to your success is our driving force – and it grows stronger by the day. Let us help you overcome any challenge standing in the way. For more information, visit us at [www.timken.com](http://www.timken.com).

## REPAIR AND SUPPORT

	SUMMARY	ADVANTAGES
 <p><b>BEARING REMANUFACTURING</b></p>	Return bearings for heavy industrial, rail and aerospace applications – even other brands – to like-new condition	<ul style="list-style-type: none"> <li>Extend service life by up to three times</li> <li>Save up to 60% on the cost of replacement bearings</li> </ul>
 <p><b>INDUSTRIAL SERVICES</b></p>	Inspect, repair and upgrade of gearboxes, electric motors and controls to OEM specs – regardless of manufacturer	<ul style="list-style-type: none"> <li>Extensive knowledge base and superior problem-solving skills meet any challenge</li> </ul>
 <p><b>ONSITE TECH SUPPORT</b></p>	Maximize uptime and equipment reliability with technicians expert in motor, gearbox and bearing field services	<ul style="list-style-type: none"> <li>Helps improve shop efficiency and lower operating costs</li> <li>Focus resources on what's important – producing high-quality product</li> </ul>
 <p><b>MAINTENANCE TOOLS</b></p>	Precision tools to install, remove and maintain bearings in the easiest, safest manner possible, including impact fitting tools, hydraulic/mechanical pullers and induction heaters	<ul style="list-style-type: none"> <li>Maximize productivity and uptime</li> <li>Hands-on field training provides practical instruction on tool use and maintenance</li> </ul>

## KNOWLEDGE AND SERVICES

	SUMMARY	ADVANTAGES
 <p><b>TECHNICAL CAPABILITIES</b></p>	More than a century of experience in friction management and materials science means cleaner, stronger materials and an ever-growing selection of high-performance products	<ul style="list-style-type: none"> <li>Application engineers excel at identifying and overcoming unique challenges, using the most advanced analytics in the industry</li> <li>Commitment to electronics solutions holds the promise of smarter, more efficient operations</li> </ul>
 <p><b>ADVANCED BEARING ANALYSIS SYSTEM</b></p>	Syber Program analyzes bearing systems, helps optimize design and development, and predict potential damage	<ul style="list-style-type: none"> <li>One of the most advanced tools on the planet, with an unmatched proprietary design</li> <li>Helps speed system concept-to-design stage with fewer test requirements</li> <li>Available customer-specific software versions offer base design analytic capabilities</li> </ul>
 <p><b>SERVICE ENGINEERING</b></p>	Using data, testing and technical resources, our engineers thrive on solving challenges and seeking ways to prevent future problems	<ul style="list-style-type: none"> <li>Offer on-site problem solving, life cycle calculations, interface design options, bearing inspections and evaluations</li> <li>Uncover new paths to greater efficiency and productivity</li> </ul>
 <p><b>ONLINE SERVICES</b></p>	Enjoy the ease and convenience of online services with a variety of options	<ul style="list-style-type: none"> <li>Access <a href="http://www.timken.com">www.timken.com</a> for product selection tools, CAD drawings, dimensional tolerances and more</li> <li>Use online stores to check product availability, place orders and track order status – 24/7</li> </ul>
 <p><b>TRAINING AND CERTIFICATION</b></p>	On-site training, end-user maintenance seminars and bearing certification programs help in selecting bearings and optimizing system performance	<ul style="list-style-type: none"> <li>Learn from experienced engineers leveraging more than a century of Timken knowledge</li> <li>Tailored training addresses audience needs – from bearing basics to advanced best practices</li> <li>Certification programs help maintenance shops gain efficiencies and improve performance</li> </ul>

Stronger. By Design.

**TIMKEN**



### Business Description

Trimble is transforming the way the world works by delivering products and services that connect the physical and digital worlds. Core technologies in positioning, modeling, connectivity and data analytics enable customers to improve productivity, quality, safety and sustainability. From purpose built products to enterprise lifecycle solutions, Trimble software, hardware and services are transforming a broad range of industries such as agriculture, construction, geospatial and transportation and logistics. For more information about Trimble (NASDAQ:TRMB), visit: [www.trimble.com](http://www.trimble.com).

### Business Model

Direct sales for one line of business and indirect through local resellers in another line of business

### Proposition for Infrastructure projects/Smart Cities



Services

Solutions

### Key Infrastructure Clients

Almost all Central and State Government organisations and PSUs L&T, Mumbai Airport, SBUT Smart city Mumbai, Municipal Corp of Greater Mumbai WSP (Railway bribege on Chenab river), AFCONS, HCC, Nuclear Power Shapurji Pallonji, Omaxe, Sobha MECON, BHEL, IRCON, GMR, GVK

Core Competencies	Horizontal/Linear Infrastructure				Vertical Infrastructure (Building)			Public Health			Monitoring	
	Planning, Survey, Asset capture and mapping, Land records survey, Topographic mapping, Hydrographic Survey, Site selection	Design/Constructability	Machine Controlled Construction	Project management and Monitoring	Survey/Conceptual Design	3D-Modeling	4D-5D BIM	Project Collaboration, Consulting programs and Construction management	Drinking water	Waste water		Solid waste
Positioning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Seismic activity/Meteorological Stations/Structures/Buildings/Subsidence-settlement due to construction
Modeling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Connectivity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Data Analytics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Total Station, GPS, UAVs, Lidar/Laser scanners, Photogrammetric and Imaging Software- Ecognition and Inpho	Quantm, Business Centre	Machine Control for Graders, Compactors, Dozers, Excavators, Pavers, etc	Vision link/ Titlos/ Lidar/Laser scanning/ UAV mapping	Sketch-up/ Total Station, GPS, UAVs, Lidar/Laser scanners	Tekla Structures, Tekla Structures Design, Vico, ProjectSight, Trimble Connect		Trimble Unity & IOT sensors (Telog)	Combination of Trimble IOT Sensors	Combination of Sensors and Software		
Training, Deployment, Customisation, Consulting, Governance & Delivery Programs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Planning, Conceptual design, 3D Modeling, Machine control, Project collaboration and Management. Asset Management for Railways/ Metros, Roads, etc											Asset management, O&M of Utilities. RTU based IOT sensors for data capture, communication and analytics of data
												Combination of Sensors, Software and services

### Proven experience / case study

Turnover  
Proposed Investments

### Key Financials

USD 2.3 Billion in 2015



# TRIMBLE'S INFRASTRUCTURE CAPABILITY DOCUMENT

## Trimble Solutions for Horizontal Construction

Construction Industry has become complicated. Economy shifts, budget changes and timeline sways suddenly making what was so certain becomes anything but unpredictable. At Trimble we believe in having a clear outlook at the future requires building on the knowledge of the past. We have been in the business of constructing with confidence for more than 35 years. In that time we invented lots of thing and led the market with innovation year after year. Trimble's solutions use integrated processes and workflows for complete Infrastructure and asset lifecycle management from the infrastructure planning, design, construction, and maintenance phases, to the operation, maintenance, and repair of infrastructure assets. Our solutions are built on deep domain knowledge that supplies comprehensive tools and foresight the industry require. To get the job done right on time and under budget we empower every owner, engineers and contractors with holistic continuum of solutions through every phase of the project. Engineers can optimize the design process and easily collaborate with both owners and contractors to deliver design built confidently with precision and accuracy every time. We offer owner increased project visibility and solutions to monitor, track, document and report onsite progress in real time. Plan with confidence, design with confidence, construct with confidence.



### Concept Planning and feasibility

The Trimble Quantm system is ideal for any horizontal infrastructure project, from small bypasses to major highways or rail projects, new projects and realignments. Trimble Quantm comprehensively integrates design standards, terrain, geological, and hydrological data, environmental areas, property ownership, and cost information in a simultaneous optimization process. This delivers a range of alignment alternatives that can be analyzed to address project owner and stakeholder concerns and maintain the momentum of the road project.



This not only Reduce planning time to deliver a finished road faster to the community, but also React quickly to emergent stakeholder constraints during the consultation process and Reduce investor risk and provide more accurate estimates for tightly constrained budgets

### **Detailed Planning and Design**

Together, Trimble Novapoint and the cloud-based BIM server and collaboration platform Trimble Quadri comprise the industry's most comprehensive BIM solution – covering road, rail, water and sewer, tunnel, bridge, landscape – all aspects of modern infrastructure design, throughout the complete Design-Construct-Maintain (DCM) process.

With Trimble Novapoint you can build a complex model of the infrastructure efficiently – including 3D terrain surfaces, 3D sub-surface layers, and 3D structures such as buildings, bridges, road signs, pipes, manholes, cables, and vegetation.

### **Estimating and Bidding**

With Trimble Business Center-HCE software Save Time, Reduce Rework and Increase Bidding Accuracy. Prepare site earthwork and construction material quantity takeoffs quickly and accurately with expanded detail using Trimble's Business Center—HCE office software. Convert digital CAD cross-sections, rapidly extract cross-section information from Adobe® PDF vector files and quickly see locations and quantities of materials for road takeoff.

### **Manage Linear Projects More Effectively**

With Trimble TILOS you can plan and manage your projects more effectively. Linear construction and maintenance projects present unique challenges, because the work is not performed in a single location.

TILOS software merges both the location and the schedule dimension into one combined time and distance graphical view that changes dynamically as conditions change.

By incorporating design details, construction challenges and the project schedule into one view, contractors, owners and civil engineers can plan and manage linear projects more effectively.

### **Execute Construction**

#### **Work Smarter, Faster and More Profitably**

Trimble offers a complete line of grade control systems—from laser or sonic-based through to 3D, these rugged systems are easy to use, fully upgradeable and flexible enough to meet a wide range of application and jobsite requirements.

Keep the site in sight with Machine Control, software and site positioning systems for site and road or rail construction. Trimble Connected Site solutions help improve efficiency and productivity, while minimizing waste and expense throughout the life of the project. Create a 3D constructible model, use it to plan the most cost-effective schedule, and then use the same model to track project progress.

## As Built Sign off: Get the Best Overall Picture in real time

To solve problems on today's construction site, field managers need more information than a paper plan can give them. Using Trimble solutions, contractors can create an audit trail of day-to-day activities. Reports can be used to capture issues in the field, design changes, or completed tasks for as-built sign off.

Intelligently combining as constructed information from across the project allows for advanced, near real-time reporting for progress payments. As-built progress can be monitored as the machine move dirt, and QA reporting and stakeout results can be generated. By combining both survey and machine data, contractors get the best overall picture of the current state of the project. In addition, soil compaction operations can be monitored to ensure compaction requirements are being met.

## Manage and maintain Infrastructure assets

The work on a road or bridge never really ends. There is a constant need to keep roads and bridges up and running. Over the lifetime of a road, maintenance will consume 1.5 to 2 times the construction cost, and the investment is even higher for a bridge.

Beyond the pavement, project owners must be aware of their assets: how many signs, guardrails, retaining walls etc., they have, where they are and their condition. Only then can they effectively manage these assets. By automating the collection of highway and road assets, Trimble solutions let owners make informed decisions about where to spend their maintenance budget most effectively.

## Case Studies:

- [Trimble Technology Improved Productivity on Highway Project in India](#)
- [Trimble Connected Site Delivers Better Jobsite Productivity and Planning](#)
- [Stantec Completes Corridor and Route Planning 50% Faster with the Trimble Quantm Alignment Planning System](#)





## Trimble Solutions for Buildings (Vertical Construction)

These days, the number of teams involved in the construction lifecycle of a single building – or many buildings – can seem too big to fit inside the projects they create. Architects, engineers, contractors, owners, occupiers, real estate professionals, facility managers and many more individuals involved in the building lifecycle have essential roles in the process. Yet, too often, each team is using tools that aren't set up to serve a common goal – challenging communication and collaboration during all of these phases, for both new and existing building projects.

At Trimble, we believe all those tools - like the teams who use them - should be oriented toward a common goal. Most of all, we believe that a platform of intelligent solutions results in intelligent buildings, so that managing the complexities across the construction lifecycle becomes easier and smarter.

Bringing together a portfolio of synergistic hardware, software and service offerings, Trimble Buildings provides highly specialized tools optimized to work together.

The design team use SketchUp to map out the plans and see the project come to life. So many architects, as well as General contractors and Construction management firms use SketchUp Pro to jumpstart on the project, not only for conceptual estimates and visualization but also because it is bar none, the easiest to draw in 3D.

Contractors who self-perform concrete and steel, need a comprehensive 3D modeling platform to capture the complexity of their projects. Tekla Structures delivers in spades, Tekla BIMsight enables the entire construction workflow to combine models, check for clashes, and share information in the same easy-to-use BIM environment-empowering project participants with the insight to solve issues in the design phase, before construction begins.

Vico Office delivers an integrated BIM workflow for construction projects. Vico Office extends basic 3D models with constructability analysis and coordination, 4D location-based scheduling and production control, and SD estimating. Now BIM-based projects, including models from all the popular BIM authoring tools, are managed with rigor, science, and connectivity. And the integrated workflow means that every time the models are updated with design changes, GCs and CMs immediately see the schedule and budget implications.

Organizing and routing construction project data to the people who need it most is what Prolog does best. RFIs are dispatched, budgets are reconciled, drawings and documentation is organized- it's Command Central whether you are walking the site with a tablet, updating the schedule in the trailer, or managing project cash flow back at HQ. Prolog is the complete system of record for managing construction project information.

Trimble Field Solutions are ubiquitous on construction jobsites around the world. The hazard yellow rugged tablets and Robotic Total Stations are hard to miss. But did you know that this equipment

and their critical layout measurements are integrated with the project models in Vico Office and Tekla BIMsight?



Installation points from the coordinated models are exported to the field equipment for layout slab edges, openings, and sleeve penetrations. Using these layout points makes the process much more efficient, as one person can now do the job of three. Trimble also provides Laser Scanning hardware and software so your team can document the existing conditions to make certain the new design is compatible.

We recognize that General Contractors and Construction Managers need and want estimating solutions that fit the way they work. WinEst comes to the table with the industry's most powerful, robust and adaptable cost-estimating and cost-modeling software—a database-driven estimating solution that uses a highly flexible spreadsheet for creating, adjusting, and presenting estimates. Having a highly-customizable database allows each contractor to capture their methodology and best practices for creating detailed estimates.

And Modelogix is the keystone for Trimble Buildings' construction solutions. Modelogix enables contractors to analyse their project cost history for fast and accurate creation of early-phase budgeting and benchmarking against the final detailed estimate. We can compare project estimates from WinEst and Vico Office and any other estimating package, as well as reconciled budgets from Prolog.

Finally, VDC Services extends your team's capabilities overnight. Whether you need to augment your staff for a new project or learn new BIM workflows and best practices side-by-side, our team is ready. Trimble can customize any package to include:

- Business Development Support
- 2D Change Reports (between two document sets)
- 3D Model Assessment
- 3D Constructability and Coordination
- 4D Schedule Simulation and Optimization
- SD Model-Based Quantity Takeoff and Estimates
- Laser Scanning and As-Built Models

Trimble Buildings is dedicated to making our customers more productive, more informed, and more profitable. Together we can build a better world.

#### **Case Studies:**

- [Chenab Bridge](#)
- [Airport Terminal Building Mumbai](#)
- [Chennai Airport Expansion Project](#)

# TURNER PROJECT MANAGEMENT INDIA PVT. LTD. (TPMI)

Suite 6, First Floor, Equinox Business Park, LBS Marg, Off BKC, Kurla (West), Mumbai 400070  
<http://www.turnerconstruction.com/office-network/india>



**Business Description**  
 Turner is a North America-based, international construction services company and is a leading builder in the United States of America. Turner, through its international operations entered the Indian marketplace in 2007 and has since gone on to offer services to local and international developers in New Delhi, Mumbai, Hyderabad, Chennai, and Ahmedabad. Turner India has staff strength of 140 plus employees pan India and provides project, preconstruction and construction management services for a variety of clients for projects of many different sizes and types.

**Business Model**  
 Turner International has operated in more than 60 countries since 1965, maintaining a regional and country-focused management structure to carry out complex buildings and mega projects. The clients are provided accessibility and support of a local firm and the strength, stability, and resources of an international company. Through successful execution of these projects, Turner has developed a reputation as a construction manager that delivers projects on time, within budget, and aligned with the quality and safety standards.

**Proposition for Infrastructure projects/Smart Cities**

Product	
Services	✓
Solutions	✓

**Key Infrastructure Clients**  
 Turner's clientele include International and Local Developers, Multinational Corporations, Government Agencies, Healthcare and Hospitality Operators, etc.

Core Competencies	Smart Cities, Smart Buildings and Mega Developments	BIM and LEED	Smart Infrastructure	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
Functional and Technical Architecture for large projects	Smart Cities, Mega Developments, SEZ, Highrises and Complex Buildings		Smart Water, Smart Parking, Smart Transportation, Smart Healthcare		Data Centres, Manufacturing Hubs						
Consulting programs and project management	✓	✓	✓		✓	✓	✓				✓
Social Inclusiveness											
Governance & Delivery Programs											
Data Analytics & Financial Services											
Technology											

**Proven experience / case study**  
 Turner International manages projects in excess of 40 million square meters in building area valued at more than \$50 billion. Turner's staff is actively providing professional building services in Southeast Asia, India, Europe, Latin America and the Caribbean, and the Middle East. With a staff of more than 1,200, Turner operates in different market segments such as residential, commercial, retail, healthcare, hospitality, data centres, aviation, township development, education, cultural and tourism. Some of the notable overseas projects include Statue of Unity, Burj Khalifa, Taipei 101, CCTV Tower, Dubai Mall, etc.

**Key Financials**

Turnover	Turner Corporation - US \$10.6 Billion
Proposed Investments	



# Turner Profile

## Personnel

5,500 Employees

## Annual Volume

\$11.0 Billion

## Founded

New York, NY  
May 6, 1902

## Core Values

Teamwork  
Integrity  
Commitment

## Profile

Turner was established in New York City in 1902 by Henry C. Turner, who said that “we are awarded most of our work based on reputation.” This remains the foundation of our company today. Now an established name worldwide, Turner has shown remarkable growth over the past 113 years.

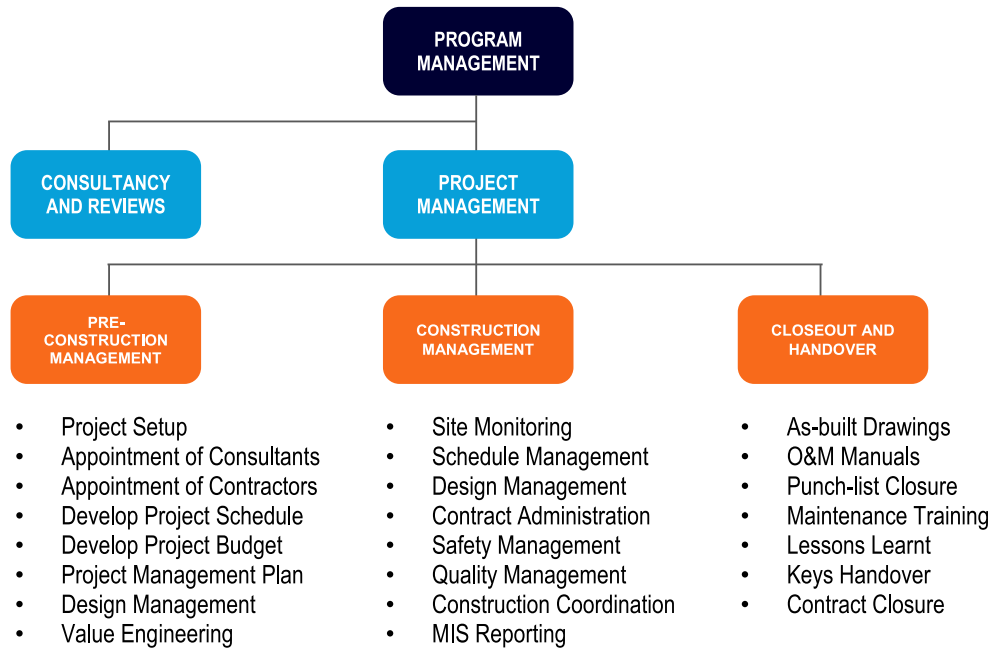
Among Turner’s clients are many Fortune 100 firms with building projects that shape the skylines of major cities. Headquartered in New York, Turner’s staff is actively providing professional building services in Southeast Asia, India, Europe, Latin America and the Caribbean, and the Middle East.

## Turner India

Turner’s Mumbai head office was formally established in 2008, and since then Turner has gone on to offer services pertaining to project, preconstruction and construction management for a variety of projects of different size and within a wide array of market segments like hospitality, residential, retail, commercial, institutional, tourism and interiors. Turner’s relationships within the country allow for a solid base of understanding and mutual respect to support the company in this dynamic marketplace.

The Turner project teams are supported by core team from the head office in Mumbai, Turner International headquarters in New York and other regional offices in Southeast Asia. We also maintain strong relationships with a large spectrum of reputable consulting firms (both local and international) whom we are able to engage according to specific project needs such as structural peer review, geotechnical engineering, facade consultancy etc.

## Scope of Services



# Turner Profile

## Turner India Clients



### Sustainable Construction

Engineering News-Record has consistently recognized Turner as the national leader in green building. Turner has 878 green projects completed or under construction, representing more than \$60 billion in construction volume and more than 18 million square meters.



### Building Information Modelling

Turner's BIM Volume represents over \$43 Billion in BIM Projects (Preconstruction, Ongoing, and Completed). Turner has used BIM technology to complete 368 projects and working on 373 projects where BIM is actively used for coordination of various tasks.



## Select Project Experience – India



### Statue of Unity, Kevadia, Gujarat | Architect: Michael Graves and Associates

The Statue of Unity is a 182-meter-tall statue (to be tallest in the world) dedicated to the life and work of Sardar Vallabhbhai Patel. The project also includes a hotel, convention center, memorial garden, visitor center building and a 3.5 km (2.2 mile) highway connecting the statue site to the town of Kevadia.



### DLF Capital Greens, New Delhi | Architect: Architect Hafeez Contractor

DLF Capital Greens is the largest private sector residential project development in Delhi. The development is located on a 38 acre site and is comprised of 23 towers varying from 21 to 29 stories with 2,856 apartments, five Community Service Personnel housing blocks of 13 to 15 stories each, and a school.

### Confidential Facility, India

The project consists of maintenance and support facilities (roads, taxiways, warehouses, utilities, hangars, training buildings, fencing/CCTV/guard houses, covered vehicle parking, etc.) located on an Air Force Base in northern India.

### Piramal Vaikunth, Thane, Mumbai | Architect: HOK

It is an approximately 1 million square feet high end residential development including three 28-storied towers, including six podium plus, two basement level for parking, and a six story community center.



# Project Experience - International

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## Smart Cities and Mega Developments



DIFC



Al Raha Development



Musheireb Heart of Doha



Burj Development

## Aviation/Transportation



Sacramento Airport



Ataturk Airport



World Trade Centre Hub



San Diego Airport

## Data Centres



redIT Data Centre



Wyndham Data Centre



South Hill Data Centre



Altoona Data Centre

## Healthcare



Middle Tennessee Hospital



Cleveland Clinic



Aga Khan Hospital



Smilow Cancer Hospital

## High Rise



Burj Khalifa



Al Hamra Tower



Bitexco Tower



BBVA Tower



VietinBank Tower



# UL INDIA (UNDERWRITERS LABORATORIES)

Kalyani Platina, 3rd Floor, Block I, No. 24, EPIP Zone, Phase - II, Whitefield, Bangalore - 560066

www.ul.com



Business Description	Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
		Power	Renewables Generation	Smart Grid										
Testing, Inspection and Certification for safety, performance, reliability and efficiency of products in the energy and infrastructure space	System Integration for Large projects													
Business Model	Functional and Technical Architecture for large projects													
	Develop locally relevant standards for safety, performance, reliability and efficiency													
Proposition for Infrastructure projects/Smart Cities	Develop and manage certification programs to ensure use of standard products													
	Knowledge Partner for electrical and fire safety													
	Product													
Services	Testing and Certification for a variety of electrical and fire safety	✓	✓		✓	✓			✓	✓				
Solutions	Program development and management to ensure safe infrastructure													

Proven experience / case study		Key Financials	
Mumbai airport		Turnover	
Delhi Metro		Proposed Investments	

**UL** is a world leader in certification and conformity assessment services and a global Standards Development Organisation (SDO). We are pioneers in standards development for safety, health, and sustainability. It is this market positioning, backed by decades of technical expertise that has helped us provide robust solutions to our clients. We help organisations develop standards using our online Collaborative Standards Development System (CSDS). Organisations benefit from our unique offering of testing, inspection, and advisory services that go beyond standard development and encompass implementation of go-to-market compliance mechanisms. In addition, we run a highly effective compliance programme through Follow-Up Inspections and Anti-Counterfeiting Operations to keep non-compliant products out of the marketplace. Our vast experience indicates that we have a body of knowledge to bank on; we use that to help manufacturers and policy-makers across the world manage risks and ensure technological progress through our consulting and training services.

UL has a rich legacy of leading development and implementation of standards and specifications across industry segments and technologies. Through our laboratories across the world and the test methodologies that our engineers come up with, we have ensured safety, performance and reliability for millions of products.



As India's population continues to grow, more people will inhabit cities. Specialists predict that about 25-30 people will migrate every minute to major Indian cities from rural areas in search of better opportunities. It is estimated that by the year 2050, the number of people living in Indian cities will touch 843 million! To accommodate this massive expansion, India needs to find smarter ways to manage complexities, reduce expenses, increase efficiency and improve the quality of life. As we move towards building smart cities, we will embrace newer technologies. Through our work over the last 120 years, we have pioneered an approach to address the risk that is inherent in progress. We make new technologies functional, reliable and safe.

## WHAT IS A SMART CITY?

A smart city is one that has universal access to basic services, empowered citizenry that contributes to effective governance and environmental sustainability. At the core, if a city is Safe, Green and Connected, it is in a great position to achieve all the goals that lead to it being called a Smart City. Social, Physical and Institutional Infrastructure need to come together to make a smart city - our tenets of Safe, Green and Connected cut across these pillars and contribute in a multitude of ways towards making a city smarter.

## SAFE CITIES



### • Safe Products

The wide range of UL's safety, performance, and compliance services helps our customers develop safer and superior quality products. UL is dedicated to partnering with manufacturers through the product life cycle. Our services start with design; move through prototyping to functional testing and certification; and culminate with factory inspection, audits and ongoing in-field management. This comprehensive approach supports everything from industrial and energy-related products to commercial and consumer products, from basic materials to advanced components.

#### Product Range includes industries such as:

Building Materials, Appliances, Lighting, HVAC, Energy & Power Systems, Medical Devices, Consumer Electronics, Performance Materials, Wire & Cable





### • Safe Buildings

UL's Building Inspection Service demonstrates the strength of vast testing experience, inspection and certification, and thorough knowledge of national and international codes. These inspections result in comprehensive reports that building owners, developers, managers and architects use to identify building compliance gaps and to guide improvements which produced confidence that fire and life safety and security systems will operate properly in the event of a fire.

**Inspections Services Include:**

Fire Prevention, Life Safety, Fire Protection, Indoor Air Quality, Energy Efficiency Audit



### • Safe Living and Working Environments

The health and safety of people at work is essential for any organisation and a right for every employee. UL's workplace health and safety solutions empower people to protect the well-being of workers, ensure organisational compliance and peace of mind and drive measureable business improvements. We work closely with our customers to understand their business needs, offering software solutions to help improve operational and financial performance through strong health and safety programs.

**Services Include:**

Learning, Safety Management, Occupational Health, Clinic and Practice



# GREEN CITIES

- Renewable Energy**

UL offers a suite of services that helps owner-operators, developers, financiers, EPCs, insurers and manufacturers manage risks associated with building and operating a PV plant or a wind farm. We help manage risk by providing technical information and data for energy yield assessments, technical due diligence, and measurements and inspection. Our extensive, flexible service portfolio covers needs that range from project planning to construction to ongoing operations and maintenance.

**Services Include:**  
 Certification of Components and Systems, Bankability & Insurability Services, Site Assessment & Plant Inspection, R&D Support & Advisory
- Green Products**

UL works to advance global sustainability by supporting the growth and development of environmentally friendly products, services and organisations. From product and organisational certifications to transparency, we help customers benefit from effective sustainability strategies. UL's expertise and guidance can help transform sustainability initiatives into a platform for growth and market leadership.

**Services Include:**  
 Testing of Products to Energy Efficiency Standards and Programmes (Star Labelling under EESL, BEE), Building Assessment for Energy Efficiency under the Energy Conservation Building Code (ECBC), Environmental Claims Validation, GREENGUARD and ECOLOGO certifications  
 Advisory and Verification of Products for use in Green Buildings and Sustainable Programmes.
- Electric Vehicles**

As more electric vehicles and related devices become available, building confidence in the safety of the technology is the key to growing the market. For consumers, the presence of third-party certification is the cornerstone of buying with confidence. UL is working with manufacturers to develop safer EV equipment, and is now recognised as the premier third-party testing organisation for the industry. For EV equipment, the UL Mark delivers peace of mind. And as the electric vehicle industry steadily evolves, UL is helping support growth by using UL Standards for the certification of charging systems and grid connection equipment.

**Certification Services Include:**  
 Level 1, 2 & 3 Charging Systems, Supply Equipment, Functional Safety at component and ECU levels





# CONNECTED CITIES



## • Smart Grids

With rising energy issues such as sustainability, renewable sources, and greater efficiency, there is heavy emphasis on Smart Grid as one of the key technologies driving an energy revolution. Utility providers, businesses, and consumers alike are empowered in managing energy more efficiently with greater control on delivery and consumption. As world leaders in Smart Grid deployment, we are at the forefront of enabling manufacturers to bring their new technologies to the market.

### Services Include:

Providing compliance, market and regulatory insights, Certification of Energy Meters to Indian and international safety and performance standards

## • Interoperability



UL believes the marketplace is clearly heading towards different inherent technologies to function and communicate, and addressing contactless interoperability is vital to facilitate a smart city.

We work closely with companies to verify that their wireless products are compliant, compatible and reliable. With our understanding of new technologies, participation in standards formulation and cross-industry experience, UL with its depth of EMC and wireless industry expertise offers full support and advice to customers, from design concept to product completion.

### Services Include:

Environmental Testing (for humidity, dust, temperature, shock, vibration handling)

Electromagnetic Interference & Compatibility (EMI-EMC) Tests Certification for full range of wireless technologies - M2M regulations, Wireless Charging, Cellular regulatory Conformance, Bluetooth® compliance

## • Transaction Security



With technology transforming transactions - offering greater ease, speed and mobility - it also creates potential security risks. UL provides end-to-end services in the world of electronic transactions, ensuring security, compliance and global interoperability within the mobile, payment, e-ticketing and data security sectors. For nearly two decades we have worked with banks, mobile network operators, governments, public transport operators and vendors to help ensure that their transaction technology is trustworthy, compliant with all standards and interoperable, worldwide.

We work on Euro MasterCard Visa (EMV) migration, contactless and mobile payments implementations (NFC/HCE/BLE), data security (PCI, Common Criteria), border control solutions, and e-ticketing (AFC) implementations.

### Services Include:

Testing & Certification, Test Tools, Advisory, Training, Security Evaluation

# CARRIER AIR CONDITIONING & REFRIGERATION A UTC COMPANY

DLF Centre, 2nd Floor, Sansad Marg, New Delhi  
www.utc.com



Business Description	Core Competencies	Energy			Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Food Safety / Security	Water Treatment	Waste Management
		Power	Renewables Generation	Smart Grid									
Carrier Commercial refrigeration provides the complete cold chain solution for the perishable food industry. We provide turnkey solutions for cold storage applications in post harvest product storage, food processing and retailing. Carrier has the products and expertise for refrigeration solutions for the food retailer stores. Also manufacture and sell ice cream deep freezers & chest coolers.	Turnkey project execution	✓											
<b>Business Model</b> Our state of the art factory is located at Gurgaon which manufactures compressor rack system, condensers, evaporators, condensing units, various display cabinets, chest coolers and ice cream freezers. Business is structured in three product lines viz., Cold Rooms, Food Retail & Unitary products. We offer turnkey solutions for the Food retail & Cold room project segment. The operation is supported with Sales, Projects & Service team with presence across 14 branch offices. A team of application engineers based at Bangalore provide innovative energy efficient solutions for the customers.	Energy efficient products & solutions	✓	✓						✓	✓			
<b>Proposition for Infrastructure projects/Smart Cities</b> Food retail products, modular cold rooms/freezers & chest coolers, Large Cold Storages for infrastructure projects. Aftermarket support for above opportunities	Prompt & extensive aftermarket support across India												
Energy efficient and competitive product solutions along with turnkey capabilities.	Centralized application support for optimum & standardized solutions												
<b>Key Infrastructure Clients</b> L&T, ETA, Snowman Logistics, Metro Cash & Carry	Customer responsive approach												
	Patented technologies like D2D, TC Coil high efficiency air curtains, LED lighting in display cases etc	✓											

Key Financials	
Turnover	120 Cr
Proposed Investments	

**Proven experience / case study**  
Projects done for State Agricultural Marketing Boards like RSAMB, MSAMB, Kappac etc in cold storages through Lloyd Insulations (Please provide addendum) : Few projects done with L&T & ETA for cold storages

# CHUBB ALBA - A UTC COMPANY

www.utc.com



## Business Description

We offer turnkey Electronic Security , CCTV surveillance , Access control , Fire detection and Physical security solutions including 24/7 alarm monitoring services . We strictly believe in the 3 absolutes Safety , Business Ethics and Internal Controls. As one of the premier Security Systems Integrators and solution provider founded in the year 1989 we have been leading with cutting edge technology products to help secure lives , property and assets for the past 25 years in India.

## Business Model

With our HQ in Delhi our operations are sub divided into 3 regions South , West and North East , with offices in Bangalore , Mumbai and Gurgaon . At each of regions we have regional sales & operations heads supported by sales , service and installation teams and serve 20 Cities .

## Proposition for Infrastructure projects/Smart Cities

**Product**  
Enterprise class security management turnkey solutions with IP CCTV surveillance , Access control , Physical security customized and designed for modern infrastructure , buildings and industries . These solution designs are not only optimal to help secure lives , property and assets , but also help in business operations and managing large personnel and vehicular traffic . We are a major player in air conditioning and refrigeration.

**Services**  
Installation and service to serve 20 cities

**Solutions**  
Committed to help secure Lives , Property and Assets .

## Key Infrastructure Clients

L&T, GVK

Core Competencies	Energy			Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation	Smart Grid								
System Integration for Large projects			✓	✓	✓	✓	✓				
Functional and Technical Architecture for large projects			✓	✓	✓	✓	✓				
Consulting programs and project management			✓	✓	✓	✓	✓				
Social Inclusiveness											
Governance & Delivery Programs											
Data Analytics & Financial Services											
Technology											

## Proven experience / case study

Completed the execution of an Integrated Security Solution with 2700 IP CCTV Cameras , 800+ access control doors for Mumbai for GVK Mumbai International airport Terminal 2 .

## Key Financials

Turnover \$1 Billion ( Total UTC India)

Proposed Investments Gurgaon and Bangalore for localization of Commercial air conditioning and Escalators



Core Competencies	Energy			Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Food Safety / Security	Water Treatment	Waste Management
	Power	Renewables Generation	Smart Grid										
System Integration for Large projects	✓		✓		✓			✓					
Functional and Technical Architecture for large projects	✓		✓		✓			✓					
Consulting programs and	✓		✓		✓			✓					
Social Inclusiveness													
Governance & Delivery Programs													
Data Analytics & Financial Services													

**Business Description**

Climate Controls & Security (CCS) is a leading solution provider for Heating, Air Conditioning & Refrigeration Systems in Commercial Buildings, Industrial Buildings & Security Systems. Contributing To Safer, Smarter, Sustainable & High Performance Buildings With Following Three Key Focus Areas:

- Climate Solutions – High-Technology Heating, Refrigeration & Air-Conditioning Solutions; Supported By Following Key Brands:
  - Carrier
  - Carrier Transicold (Transport Refrigeration)
  - Toshiba (Air-Conditioning Products)
- Energy Management Solutions; Supported By Following Key Brands:
  - Automated Logic Control-Only
- Fire And Security – Fire Detection & Suppression, Intrusion Detection, Access Control & Video Surveillance Products Including Installation, Inspection, Monitoring & Response Solutions; Supported By Following Key Brands:
  - Eddie
  - Die-Tronics
  - Edwards
  - Fenwal
  - Edwards
  - GSC
  - Lenel

**Business Model**

We have CCS India HQ at Gurgaon, Haryana alongwith R&D center at Hyderabad, Andhra Pradesh and Sales & Engineering Excellence Centre at Gurgaon, Haryana. Having 26 company offices & over 850 trained channel partners across India, we are committed to serve customers at every single stage of product life cycle i.e. pre-sales, sales, execution & after-sales at almost every possible part of country.

**Proposition for Infrastructure projects/Smart Cities**

**Product**

- Commercial Applied Segment: Centrifugal Chiller, Water-cooled Screw Chiller & Air-side products
- High Efficiency products to provide cost-effective energy saving solutions to smart building
- Suitable for wide applications & variable load conditions
- Competitive Life Cycle Cost solution based on the following features:
  - Reliable thru patented designs & rugged thru exceptional endurance tests (VFD) variable Refrigerant Flow System
  - High Efficiency Air-cooled system solution to build modern residential & commercial buildings
  - Suitable for wide applications & varied climatic zones with high diversity
- With leading brands including Edwards, Lenel, GSC, Kidde, we offer wide range of solutions including Fire Alarm, Detection, Access Control & Video Surveillance etc.

**Services**

Having 36 Company Offices & Over 850 Trained Channel Partners Across India We Are Committed To Provide End-to-End Single Stage of Product Life Cycle i.e. Pre-Sales, Sales, Execution & After-Sales At Almost Every Possible Part of Country.

**Solutions**

With company that is built on innovation & performance with a reputation for innovative solutions, we have a strong track record of Excellence in manufacturing facility & Engineering solutions. We have a dedicated team across India, we provide solution to our customers at every single stage of product life cycle i.e. pre-sales, sales, execution & after-sales.

**Key Infrastructure Clients**

Delhi International Airport Limited, Kotak Mahindra Bank, ITC Royal Gardenia, Reliance Ada, Apollo Hospitals

Key Financials	
Turnover	INR 1,000 crores (approx)
Proposed Investments	

**Proven experience / case study**

Completed the execution of HVAC systems for T-3 Delhi International Airport Limited and other large projects

# WATERHEALTH INTERNATIONAL

# 9-7, Survey No. 308/1, Nagaram, Keesara Mandal, Hyderabad Urban - 500 083, Telangana, India.  
Tel : +91 40 6701 1709, Fax: +91 40 6701 1710, email: infoindia@waterhealth.com www.waterhealth.com



**Business Description**  
WaterHealth International (WHI), a US based Social Enterprise and a global leader in the Community/Water Systems Industry, WaterHealth installs, operates, maintains and quality monitors decentralized community water systems called WaterHealth Centers (WH-Cs).  
WaterHealth is currently providing access to safe and affordable drinking water to more than seven (7) million people through more than 500+ plants across India, Ghana and Nigeria.

**Business Model**  
The Company installs, operates and maintains "micro-utilities," called WaterHealth Centers (WH-Cs) in the targeted communities. The WaterHealth Center is the flagship product of the Company wherein raw water is treated through a six (6) stage purification process. The water thus obtained is World Health Organization (WHO) quality safe drinking water that also meets the Indian drinking water standards (IS:10500).  
These decentralized systems are established through a Public Private Community Partnership (PPCP) whereby the Company constructs a water purification plant (which can typically serve a community ranging from 10,000 to 25,000 people). The infrastructure i.e. land, raw water source and electricity are provided by the community while WaterHealth sources the funds to set up the water purification plants. The WHCs are constructed and run on a Build Operate Transfer (BOT) agreement with the Local Government i.e. Panchayat or the Municipality with a concession term spanning between 5-25 years, with an option to extend the term on expiry. This ensures continuous availability of safe drinking water to the community at affordable rates at all times.

**Proposition for Infrastructure projects/Smart Cities**

<b>Product</b>	Decentralized Community based water purification system
<b>Services</b>	Operations, maintenance and delivery of purified drinking water to consumers
<b>Solutions</b>	Water purification plants, water ATMs

**Key Infrastructure Clients**  
Bruhat Bengaluru Mahanagara Palike (BBMP), Delhi Jal Board  
Large Urban Local Bodies (Tumkur, Raichur, Chitradurga, Bijapur, Yadodara, etc), Indian Railways Catering and Tourism Corporation (IRCTC)

Core Competencies	Energy		Buildings	Smart Transportation	Tele-com	Manufacturing/Industrial	IT Enabled Services	Public Safety	Public Health	Water Treatment	Waste Management	Aviation and Defence
	Power	Renewables Generation										
System Integration for Large projects												
Functional and Technical Architecture for large projects												
Consulting programs and project management										✓		
Social Inclusiveness									✓	✓		
Governance & Delivery Programs										✓		
Data Analytics & Financial Services									✓	✓		

Key Financials	
Turnover	
Proposed Investments	

**Proven experience / case study**  
Please refer to the Sheet labelled "Case Study"

ISO 9001:2008 CERTIFIED COMPANY  
[www.waterhealth.com](http://www.waterhealth.com)

Be a part of an audacious rollout of  
Community Water Systems in India



water  
health



## WaterHealth International

### Affordable solutions for safe drinking water

WaterHealth International is a global leader in providing access to safe, clean and affordable drinking water to underserved communities. WaterHealth has developed a low-cost business model for the installation, operation, maintenance and quality monitoring of Community Water Systems (CWS) called WaterHealth Centers. WaterHealth has installed more than 500 WaterHealth Centers across India, Bangladesh, Ghana, Nigeria and Liberia, providing access to safe drinking water to over five (5) million people under the brand name 'dr. water'.

## WaterHealth India

WaterHealth India, a wholly owned subsidiary of WaterHealth International, was incorporated in 2006 with a vision to provide safe, scalable and affordable drinking water to the underserved communities across India.

In the nine (9) years of its operations WaterHealth has successfully installed and is now operating over 450 WaterHealth Centers across Andhra Pradesh, Telangana, Gujarat, Karnataka and Tamil Nadu.



## Pillars of Business Sustainability - WaterHealth International

### Social Sustainability

WaterHealth's scope of work extends beyond the purification and the water life cycle management i.e. WaterHealth runs well conceived Social Marketing programs to change community behaviour towards safe drinking water. These programs are customized to spread awareness about safe water even in communities where little or no healthcare knowledge exists.

### Institutional Sustainability

WaterHealth partners with the local institutions and key opinion leaders such as Panchayat, Municipality, Influencers and engages in capacity building within the community for institutional sustainability.

### Environmental Sustainability

WaterHealth Centre consumes less than 1% of the total water used by a community. However despite using such small quantity of water, the Company's converts 65 to 70% of raw water into purified water. The remaining reject water is treated to discharge norms and is harvested by discharging it to the aquifer.

### Technical Sustainability

WaterHealth has standardized operations, quality and maintenance procedures across all its WHCs. The operation team comprising of technically qualified personnel maintain the plant while samples from different WHCs are sent to NABL<sup>1</sup> certified laboratories for water testing.

### Financial Sustainability

WaterHealth manages all processes and systems associated with the consumer life cycle including consumer acquisition and servicing (distribution) with significant rigour, this leads to higher adoption of safe water. The high adoption/demand in turn leads to the financial sustainability of a WHC.

<sup>1</sup>NABL - National Accreditation Board for Testing and Calibration Laboratories

## WaterHealth Impact

WaterHealth engaged an accredited Market Research Agency, Sambodhi and some findings are:

- 21% reduction in waterborne diseases in WHC households
- 40% reduction in average time spent per day by WHCs households for fetching water
- 1.6 times women are more likely to engage in economically productive activities.
- Increase in the average annual income of women of households consuming dr. water is ₹4,700 higher than other comparable households.

International Finance Corporation (IFC) conducted through IMRB and some findings are:

- dr. water consumer households were approximately 9 times less likely to experience a waterborne disease compared to non-consumer households.

## Partnership with WaterHealth: Stakeholder Benefits

### Urban Local Body

- A Public Private Partnership (PPP) to increase access to safe drinking water.
- Sustainable and long lasting solution.
- Generation of goodwill in the community where the WHCs are installed.

### Community

- Safe drinking water available at the doorstep.
- Education and awareness on drinking water.
- Eradication of waterborne diseases.
- Complete drinking water solution.

### WaterHealth

- Opportunity to serve the underserved segments in the urban communities.
- Long term partnership with the Urban Local Bodies.

#### Corporate Office

#### WaterHealth India

# 9-7, Survey No. 308/1, Nagaram, Keesara Mandal,  
Hyderabad Urban - 500 083, Telangana, India.  
Tel : +91 40 6701 1709, Fax: +91 40 6701 1710  
email: infoindia@waterhealth.com www.waterhealth.com

#### Branch Office

#### Delhi

# Unit no. 82, Local Shopping Complex(LSC),  
LU Block, Pitampura, New Delhi – 110 034,  
India.



### Business Description

Xylem India is a company with a long and storied history, formed in 2011 as a spin-off from IIT, we immediately took our place as a leading global water technology company. We are one of the largest companies in the world focused on providing technology, equipment and services for water and wastewater applications. Xylem has nearly \$4 billion in annual revenues, more than 12,500 employees in all parts of the world and a heritage that dates back more than 150 years. We are uniquely positioned at the center of an industry that is vital to everyone around the world. We devote our technology, time and talent to advance the smarter use of water. And we look to a future where global water issues do not exist.

### Business Model

Xylem in India is operational since 2008 (from IIT days) with HQ & Factory in Vadodara , branch offices in Mumbai, Delhi, Pune, Chennai & Bangalore. Approximately 200+ employees and 30+ distributors & several authorised service providers to serving the customers. Business is categorised into two broad segments. Water Infrastructure and Applied Water Systems. Water Infrastructure comprises of move, treat and testing of water and waste water. Applied water comprises of Residential and commercial buildings, Industrial and agriculture segments of water use.

### Proposition for Infrastructure projects/Smart Cities

**Product**  
Water pumps, water treatment plants, Online flow/quality measurements, Waste water pumps, Waste water treatment with Sequential Batch reactor, UV and Ozone for reuse, Online monitoring and analysis of water and waste water, Quality control, Water boosting pumps, UL-Fm Fire protection pumping systems, drainage pumps for building, packaged waste water treatment plants for buildings, flood control & dewatering pumps, Storm water dewatering systems etc.

**Services**  
Total Care, Annual Maintenance contract, Rental etc

**Solutions**  
Sewage Pumping systems, Water and Waste water treatment plant design, Water intake pumping station design, Building energy monitoring, Online monitoring of sewage pumping station and treatment plants, pressurised water network, leakage monitoring etc.

### Key Infrastructure Clients

Essar, Megha Engineering, VA Tech Wabag, Larsen & Toubro, NTPC

Core Competencies	Energy		Smart Transportation	Telecom	IT Enabled Services	Public Safety	Public Health	Water Treatment	Wastewater Management
	Power	Renewables Generation							
System Integration for Large projects								✓	✓
Functional and Technical Architecture for large projects								✓	✓
Consulting programs and project management								✓	✓
Social Inclusiveness								✓	
Governance & Delivery Programs									
Data Analytics & Financial Services									

### Proven experience / case study

Sewage treatment plant for Mumbai Metro & Hyderabad Municipality

HVAC pumps & Booster pumps for several Hotels, Airports & Commercial Buildings

Irrigation projects for Sardar Sarovar Nigam Limited

### Key Financials

Turnover

\$ 20 MM - Xylem India, \$ 4 BN - Xylem Global

Proposed Investments

Need based

**XYLEM IS A PREMIUM APPLICATION SOLUTIONS COMPANY SOLVING OUR CUSTOMERS' MOST CHALLENGING WATER PROBLEMS BY LEVERAGING UNIQUE GLOBAL ASSETS AND A HIGH PERFORMING CULTURE.**



**NORTH AMERICA**  
**Idaho Municipality Turns to Xylem for UV Wastewater Treatment**  
 Xylem brought its Wedeco ultraviolet (UV) disinfection technology to American Falls, Idaho to purify municipal drinking water and wastewater. Compared to traditional disinfection with chlorine, UV disinfection is an environmentally friendly alternative that produces no by products.

**EUROPE**  
**Xylem Pumps For Europe's Largest Wastewater Treatment Plant**  
 Europe's largest wastewater treatment plant treats about 1.5 million cubic metres of wastewater in the Paris region every day. In the frame of the modernization of the plant, Paris municipal authority chose Xylem for the supply of more than 90 Flygt pumps, thanks to Xylem expertise and energy efficient technologies.

**LATIN AMERICA**  
**Honduras City No Longer High and Dry**  
 Through a remarkable engineering feat powered by Goulds Water Technology brand pumps, Xylem helped bring precious water resources to a drought-stricken city in Honduras six miles up a mountain.

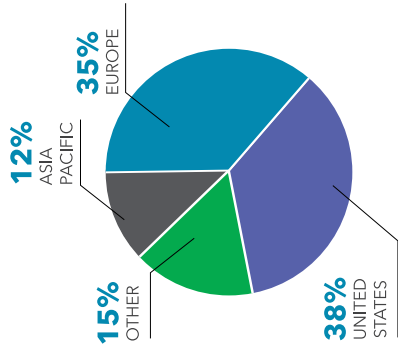
**AFRICA**  
**Xylem's Presence in Africa Flows Strong**  
 Xylem South Africa is responsible for Botswana, Gabon, Cameroon, Ghana, Kenya, Malawi, Tanzania, Mauritius, Mauritania, Madagascar, Ivory Coast, Senegal, Namibia, Zambia, Nigeria and the DRC. It provides technical design, engineering and aftermarket support and boasts the largest submersible pump rental fleet on the continent with 600 units.

**MIDDLE EAST**  
**Xylem Participates in World's Largest Water Reuse Installation**  
 Technology from Xylem's Flygt-Sanitaire and Lowara brands is powering the world's largest water reclamation and reuse center in Kuwait, a desert country where about 75 percent of potable water must be distilled or imported.

**ASIA**  
**SMART Tunnel in Kuala Lumpur, Malaysia**  
 Xylem designs pumping solution for unique dual-function tunnel in Kuala Lumpur. The award winning Storm Water Management and Road Tunnel (SMART) tunnel in the Malaysian capital Kuala Lumpur, that has been successfully diverting flash floods in the city, uses Xylem Flygt brand pumps for transport and dewatering.

**AUSTRALIA**  
**Using Stormwater at Sydney Airport**  
 Sydney Airport recently underwent a major infrastructure development project focused on making it more efficient and environmentally friendly. The contractor turned to Xylem and its Flygt, Sanitaire, Wedeco and Lowara brands to provide a new stormwater recycling program intended to save approximately 350 million liters of fresh water per year.

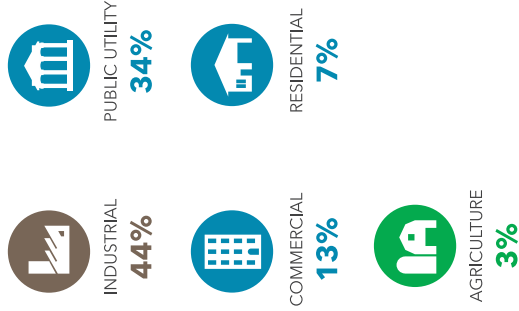
**2014 SALES & REVENUE \$3.9 BILLION**



**BY THE NUMBERS**

**XYLEM OPERATES IN MORE THAN 40 COUNTRIES AND 350 LOCATIONS**  
**XYLEM PRODUCTS ARE SOLD IN MORE THAN 150 COUNTRIES**  
**EMPLOYEES 12,500**

**MARKETS SERVED**



**NYSE TRADE SYMBOL**

**XYL**

**GLOBAL HEADQUARTERS**

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 FAX +1 914-323-5800  
 WWW.XYLEMINC.COM

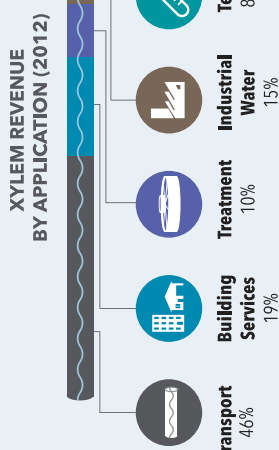
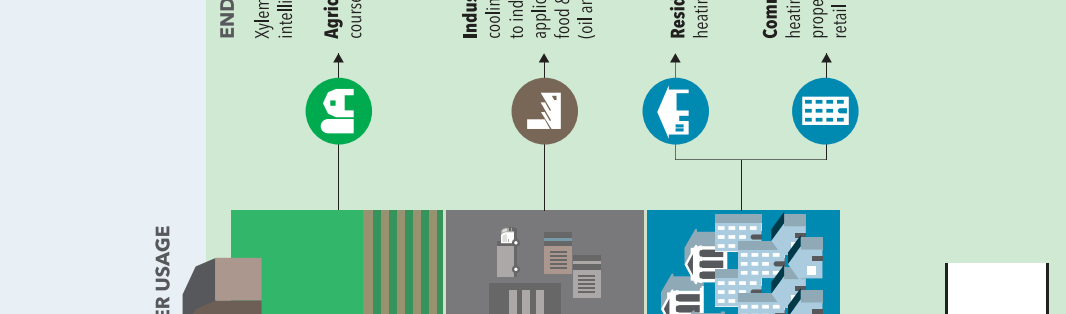
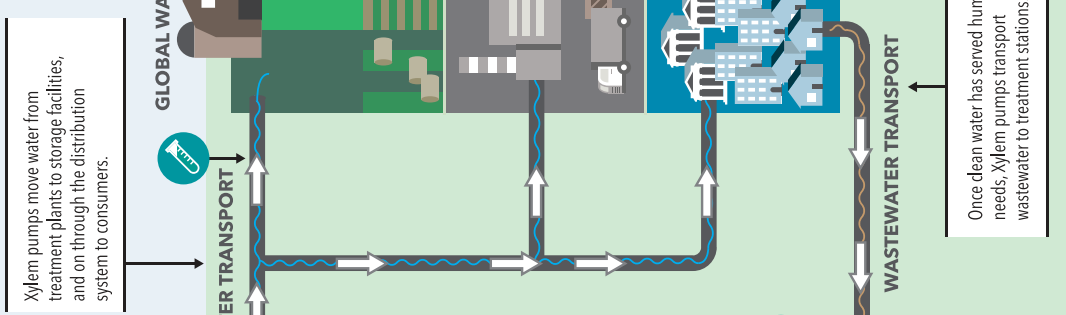
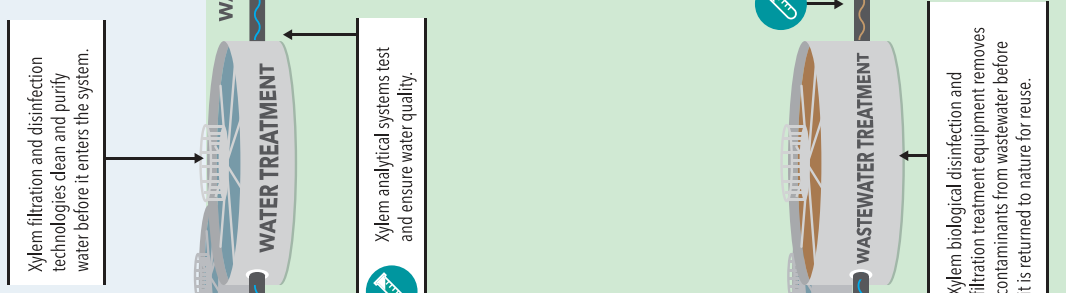
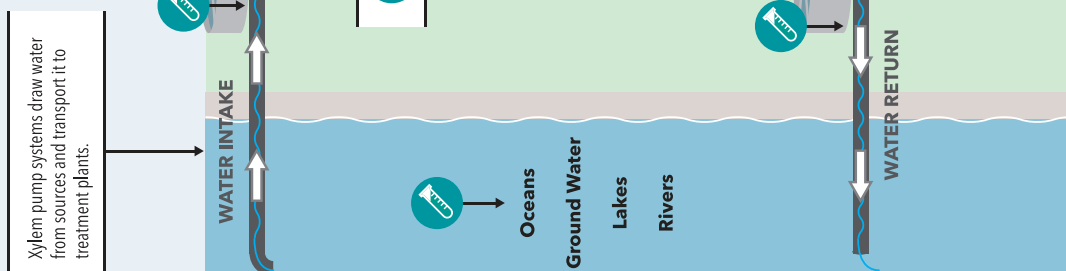
**XYLEM WATERMARK**  
 Xylem Watermark is Xylem's corporate citizenship and social investment program. Its mission is to provide and protect safe water resources for communities in need around the world.

- Provided safe water and sanitation solutions to more than 2 million people
- Work with 5 strategic partners in more than 20 countries across 5 continents
- Employees have raised more than \$1.2M dollars to support Xylem Watermark nonprofit partners
- More than 150 employees have volunteered on Xylem Watermark projects in the field
- Have responded to more than 15 water-related disasters with clean water and new water infrastructure



**DELIVERING INNOVATIVE TECHNOLOGIES THAT TOUCH EVERY PART OF THE WATER CYCLE WITH A SINGLE GOAL IN MIND: ENABLE SUSTAINABLE USE OF WATER EVERYWHERE.**

- GLOBAL INFLUENCES DRIVING OUR BUSINESS**
- Water Scarcity
  - Environmental Regulations
  - Aging Infrastructure
  - Population Growth
  - Infrastructure in Emerging Markets
  - Urbanization



**XYLEM SERVES \$35 BILLION** of the Global Water Equipment and Services Market.



# XYLEM INDIA CAPABILITIES

200+ Employees

Head Quarter / Factory / Engineering Center at Vadodara

Present in Mumbai / Delhi / Bengaluru / Chennai / Pune









**AMERICAN CHAMBER OF COMMERCE IN INDIA**

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New Delhi - 110 016, INDIA

Tel : 91-11-2652 5201/02, Fax: 91-11-2652 5203

Website: [www.amchamindia.com](http://www.amchamindia.com)