Smart Cities: Emerging Technologies and Innovations in Local Government
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Today’s Agenda

- Global Public sector trends
- Smart Cities
  - City Trends
  - IDC Government Insight’s Smart City Framework
    - Definition of a Smart City
    - The Ecosystem
    - IDC GI’s Taxonomy
  - The Path to Smart City
    - Maturity Model
    - Barriers and challenges
  - City examples
  - Essential Guidance
Global IT Industry Growth Trends

Source: IDC Worldwide Black Book; growth in constant currency

Worldwide IT Spending Growth 1996–2016e (%)

Global IT Industry Growth Trends

Web 1.0

Web 2.0

Cloud

Social Business

Mobility

Big Data/Analytics
Four Key Drivers for Government in 2013

**Operational efficiency**
Moving from narrower-focused IT cost reduction to broader overall strategies to reduce operational costs

**Mission Effectiveness**
Rationalizing and pervasively investing in IT solutions and services that improve information value and broaden service channels

**Digital Engagement Strategy**
Rationalizing and pervasively investing in IT devices and solutions that most effectively enable the conduct of government business

**Economic sustainability**
Creating strategies for and investing in technologies that foster national and regional quality of life and economic growth/competitiveness
Spending Size and Growth Key In NA, AP Developing & ROW

North America
Western Europe
AP Mature
AP Developing
Rest of World
Government Still Big Spender

- **2011**
- **2012**
- **2013**
- **2014**
- **2015**
- **2016**

- Education
- Government
- Healthcare
Four Forces of Industry Transformation

By 2020, 67% of 4 pillar solutions will have the LOB as the buyer and 3rd platform becomes enterprise-focused.
How The Four Forces Affect IT Investment

- **Social Business**
  - E-Business 2.0
    - Business network productivity
    - Building communities
  - Integrated Business Intelligence
    - Management productivity
    - Building models

- **Cloud**
  - Application Stores
    - Individual productivity
    - Building platforms

- **Mobility**
  - Smart Services
    - Process productivity
    - Building systems
The *Interactive* Network of Intelligent Devices 2020 - 10’s Billion Devices

Does not include all sensors, which will enable this intelligence, M2M, micro-messaging, etc.
Proliferating Technology = Exploding Data

Home Health

Home Sensors

Body Sensors

mHealth and mGov

Social Networks
The Future of Digital Information

Mobile devices and apps, smart sensors, cloud computing solutions, and citizen-facing portals will create a 48% increase in digital information, creating new records management access and retrieval issues.

- Government data continues to be generated and digitally archived in increasing rates.
- Digitizing information drives productivity - if paper documents were available in digital format, government workers would gain almost an hour a day.
- A fourth of government employees are unable to find or access digital information they needed more than half the time.
- As digital information expands and becomes more complex, information management, processing, storage, security, and disposition become more complex.
- Rise in digital information will create a records management crisis for government agencies that are not deploying new capture, search, discovery, and analysis tools that help organizations manage and use their information.
The Future in Cloud Sharing/Collaboration

Cloud sharing/collaboration among governments (federal, state, and local) and shared services will account for 18% of the government cloud market and create new business models for IT procurement and provisioning.

- Cloud Hubs (predicted last year, now well underway)
- Cloud/shared services across multiple government levels help standardize regional approaches to government business processes
Governments begin to adopt third generation platforms that combine cloud, big data, mobile, and social business to create higher public value.
Smart Cities Overview

- City Trends
- IDC Government Insight’s Smart City Framework
  - Definition of a city and Smart City
  - The Ecosystem
  - IDC GI’s Taxonomy
- The Path to Smart City
  - Maturity Model
  - Barriers and challenges
- City examples
Technological and Demographic Trends Creating Need For Solutions

- Citizen Transformation
- Digital Universe to Reach 40,000 Exabytes
- Cost Pressures
- Staff Shortages
- Government Largest Big Data Consumer
- Economic Uncertainty
- 1 Billion Vehicles Worldwide in 2020
- By 2015, more US consumers access Internet by mobile device than PC
- 72% Urban Population Increase by 2050
- 45% of new apps will be mobile in 2013 in local government
- 1 Billion Vehicles Worldwide in 2020
- By 2015, more US consumers access Internet by mobile device than PC
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Worldwide Size & Growth Rates of City Ecosystem Spending

- **Education**
- **Healthcare**
- **Transport**
- **Public Safety**
- **Social Services**
- **Tax & Revenue**
- **Utilities**
- **Water**

*Market Size*
*5 Yr CAGR*
Smart Cities Driven By Innovation

Sustainability          Economic Development          Innovation          Citizen Sourcing
IDC GI Definition of a “City” is Broad

- A broad view of what a city is – it can be a district, town, city, county, metropolitan area, city-state (such as Singapore) or even a port, military base or university campus.
  - There is broad applicability to Smart City concepts. They are taking hold in the private sector such as in stadiums.

- Often Smart City initiatives will cross city boundaries such as in metro area transportation initiatives that involve several cities within a large metropolitan area or “urban agglomerations.”
IDC GI Definition of Smart City Is Outcome Focused

- A Smart City is a finite entity with its own local governing authority that uses ICT technologies to achieve the explicit goals of improving the quality of life of its citizens and sustainable economic development.

- These goals are achieved via improved service delivery, more efficient use of resources (human, infrastructure and natural), and financially and environmentally sustainable practices that support economic development.

- Cities operate in a globally competitive environment and the ultimate goal of Smart City initiatives is to attract businesses and citizens for a vibrant city economy.

- Smart City solutions integrate information and operations within and between city systems and domains. The ultimate goal is a connected system of systems.
### Key Characteristics of Smart Cities

<table>
<thead>
<tr>
<th>Key Characteristics</th>
<th>Smart City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vision</strong></td>
<td>Sustainable development</td>
</tr>
<tr>
<td><strong>Level of government</strong></td>
<td>City, Local Government, Education, Healthcare (See IDC’s broad “city” definition)</td>
</tr>
</tbody>
</table>
| **Key Goals**                        | • Economic development – job creation, foreign investment  
• Sustainable growth  
• Higher quality of life for citizens  
• Cost and Infrastructure Efficiency  
• Deliver the right service and information at the right time to stakeholders |
| **Partnerships with third party service providers** | Necessary (local partnerships key)                                       |
| **Innovation**                       | Top down leadership, Citizen in                                           |
| **Governance**                       | Top down, Cross-domain, Community-based                                   |
| **Collaboration across service domains, processes, agencies** | Necessary                                                               |
| **Customer View**                    | 360 degree view of City Systems, Neighborhoods and Communities            |
| **Relevant Terms**                   | mGov, city 2.0, Future City, Resilient City, Safe City, Eco Cities, Intelligent Cities, Sustainability, Internet of Things, Intelligent Transportation Systems, Cloud, Analytics/Big Data, Social business, Mobile apps and infrastructure |
| **Planning horizon**                 | 3-5 year strategic initiatives; up to ten to fifteen years for full deployment |
What Makes A Smart Project? A Framework

Gather Data
- Instrumentation of Things: RFID, Intelligent Sensors, Video
- Citizen Input
- External Data Sources: Weather, GIS, 311/911, Data base Feeds, etc

Aggregate & Analyze Data
- Event Processing Software
- Integration Middleware
- Predictive Analytics
- Performance & operational Analytics
- Business Intelligence
- Business Rules
- Process Optimization

Execute Optimal Response
- Dashboards, Portals: Visualization, Maps, Alerts, KPIs
- Work Flows, Automated Responses
- Protocols and procedures – new business processes
- Collaboration among domains; Info to Citizens

Track and Measure Outcomes
Refine Algorithms

Pervasive Broadband Platform
- Data Services · Conferencing & Communications · Wireless Sensor Networks · Bluetooth · WiFi · Cellular · NFC

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And Working Within A Stakeholder Ecosystem

- **Public Sector**
  - City, County, State/Province, National, International, Education, Healthcare

- **Technology & Domain Suppliers**
  - ICT, Transport, Services

- **Individuals & Communities**
  - Citizens, NGOs, Local Associations

- **Planners & Developers**
  - Urban planners, Real Estate Developers

- **Utilities**
  - Electric, Water, & Gas utilities

- **Private Investors**
  - Private investors, Development Banks

**Partnerships**
Key Smart City Functional Areas

- Administration
- Economic Development
- Government Insights
- Intelligent Public Safety
- Government Insights
- Intelligent Transportation Systems
- Government Insights
- Manufacturing Insights
- Smart Buildings
- Energy Insights
- Smart Grid
- Smart Water
- Energy Insights
- Intelligent Industries
- Connected Health
- Government Insights
- Smart Public Works
- Government Insights
- Smart Education
- Government Insights
- Manufacturing Insights
- Health Insights
Smart City Pyramid: Technologies

- Devices/ Semiconductors/ Modules
- Connectivity, Service Enablement
- Platform and Systems
- Middleware
- Applications
- Analytics & Discovery
- Decision-support and automation SW

Security

Professional Services
Smart City Key Technologies in Detail

- ERP
- Asset management
- Content apps
- Social apps
- Mobile apps
- Enterprise services bus
- Event-driven process automation
- Device-enablement platforms
- Specialized SW

- Servers
- Storage
- Smart phones
- Feature phones
- Tablets
- GPS
- Wearable Computers
- Sensors/RFID
- Cameras
- Smart Meters
- Embedded Systems
- Smart cards
- Specialized devices

- Business analytics/intelligence
- Performance mgt
- Data warehouse platform SW
- Socialytics (Text, Sentiment)
- Rules and Complex event processing engines
- Streaming data analytics
- Business process automation

- Data Services & Broadband
- Conferencing & Communications
- M2M
- Wireless Sensor Networks, Bluetooth, WiFi, Cellular, NFC

Applications and Platforms
Analytics, Decision Support & Automation
Professional Services
Security
Connectivity & Services Enablement

SMART CITY

Devices / Hardware
Smart City Vendor Ecosystem

- Software/Platform Vendors
- Systems Integrators & Professional Services
- Other Government Agencies
- Mobile Operators
- SMART CITY CUSTOMER
- Data Analytics Vendors
- Hardware & Device OEMs
- Solution Providers
- Industry Specialists
IDC’s Smart City Maturity Model: A Long Term Proposition

Ad hoc project, department-based planning and discrete Smart projects.

Opportunistic project deployments. Proactive collaboration within & between departments. Key stakeholders aligned around beginning strategy, barriers to adoption are identified.

Recurring projects, events and processes identified for integration. Formal committees document strategy, processes, technology with stakeholder buy-in.

Formal systems for work/data flows, technology in place; standards emerge. Performance management based on outcomes shift culture, budgets, IT investment, governance structure.

Sustainable, city-wide platform in place. Agile, continuously improving strategy, IT, governance allows for autonomy within integrated system of systems. Superior outcomes deliver differentiation.
IDC’s Smart City Maturity Model Overview

<table>
<thead>
<tr>
<th>Stages</th>
<th>Ad hoc</th>
<th>Opportunistic</th>
<th>Repeatable</th>
<th>Managed</th>
<th>Optimized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Characteristic</td>
<td>Siloed</td>
<td>Intentional</td>
<td>Integrated</td>
<td>Operationalized</td>
<td>Sustainable</td>
</tr>
<tr>
<td>Goal</td>
<td>Tactical Services Delivery</td>
<td>Stakeholder Buy-In</td>
<td>Improved Outcomes</td>
<td>Prediction &amp; Prevention</td>
<td>Competitive Differentiation</td>
</tr>
<tr>
<td>Benefit</td>
<td>Technology enables project-driven successes</td>
<td>Foundational Governance and Strategic planning</td>
<td>Culture shift, Rationalized &amp; Leveraged Assets</td>
<td>Adaptive, Sense &amp; Respond Systems</td>
<td>Agility, Innovation, Continuous Improvement</td>
</tr>
</tbody>
</table>
# Smart City Maturity Model Key Measures For Progress

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Vision</th>
<th>Leadership</th>
<th>Business Case</th>
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</thead>
<tbody>
<tr>
<td><strong>Culture</strong></td>
<td>Innovation</td>
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<td></td>
<td>Citizen &amp; Community Engagement</td>
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<tr>
<td><strong>Process</strong></td>
<td>Governance</td>
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<td></td>
<td>Partnerships</td>
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<tr>
<td><strong>Technology</strong></td>
<td>Architecture</td>
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<td></td>
<td>Adoption</td>
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<tr>
<td><strong>Data</strong></td>
<td>Use</td>
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<tr>
<td></td>
<td>Access</td>
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</tbody>
</table>
More Effort and Time Required To Get to Repeatable and Managed

- The majority of cities
- A handful of cities and only in specific city functions.
- The growing list of cities; small % of total.

- None
- None
- None
- None

Funding & Business Models
Processes & Governance
Optimized
Managed
Repeatable
Opportunistic
Adhoc
Finding Opportunities

- Large events (both one off and repeatable)
- Serious failures
- Innovators
- Start small and focused, scale and grow
- City-specific account planning
- Local partnerships

Urgency

“The future has already arrived. It’s just not evenly distributed yet.”

William Gibson
Case Study: Boston

- **Large events:** Snow storms and other problems
- **Innovators:** Civic Innovation Organization within Mayor’s Office
- **Start small and focused, scale and grow:** CitizenConnect to CityWorker to CommonwealthConnect
- **Local partnerships:** Used local programmer, crowdfunding
- **Maturity:** Moving from Opportunistic to Repeatable
- **Issue:** Need a sustainable business model
The Time Is Now: Essential Guidance for Vendors

- Thought leadership is important. Governments are looking to vendors that have vision. Take advantage of early mover opportunities.

- Successful projects will rely on successful partnerships - with other vendors, government, academia. Localization and local partners are especially important in this market.

- Find the innovators and change agents; help to build an innovation ecosystem. LOB decision makers increasingly important.

- Build a business case by finding smaller, discrete projects that have clearly defined ROI (i.e. Smart Parking, Smart Water) and then help government to reinvest and extend solutions across the enterprise.

- Help government organizations leverage existing legacy investments and build on them – the next platform with apps and services “on the edge.”

- Demonstrate capabilities across domains in the IT ecosystem.

- Be a Smart Vendor: outcome focused, skin in the game.
<table>
<thead>
<tr>
<th>Research Topic</th>
<th>Document Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Relationship between Smart Government and Smart Cities Concepts</td>
<td>Perspective</td>
</tr>
<tr>
<td>US Survey Results</td>
<td>Perspective</td>
</tr>
<tr>
<td>Smart Cities Progress in EMEA</td>
<td>Business Strategy</td>
</tr>
<tr>
<td>Worldwide Smart Cities Predictions 2013</td>
<td>Top 10 Predictions</td>
</tr>
<tr>
<td>The Evolution of the Smart City: IDC GI Smart City Maturity Model v2</td>
<td>Best Practices</td>
</tr>
<tr>
<td>The Social City: Emerging Models of Innovation and Citizen Engagement</td>
<td>Methods and Practices</td>
</tr>
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<td>Smart Parking: A Place To Begin</td>
<td>Perspective</td>
</tr>
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<td>NextGen 311: Lessons Learned and Future Opportunities</td>
<td>Best Practices</td>
</tr>
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<td>Smart Government Buildings: Fostering Resilience, Sustainability and Cost Savings</td>
<td>Perspective</td>
</tr>
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<td>Mobile Device and Application Management: Embrace Disruption &amp; Avoid Chaos</td>
<td>Vendor Assessment</td>
</tr>
<tr>
<td>Big Data and Analytics in Policing</td>
<td>Best Practices</td>
</tr>
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<td>Smart City Business Consulting MarketScape</td>
<td>Marketscape</td>
</tr>
<tr>
<td>Worldwide Smart Cities Taxonomy</td>
<td>Taxonomy</td>
</tr>
<tr>
<td>Physical Security Information Management</td>
<td>Business Strategy</td>
</tr>
<tr>
<td>Maturity Model: China Perspective</td>
<td>Methods and Practices</td>
</tr>
</tbody>
</table>

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Questions

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