Smart Cities – from public service optimization to urban sustainability

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The Challenge

How cities can leverage digital transformation of the society?

Nokia sees this challenge as an opportunity.

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Government administrations have been in search of smart cities for centuries

Urban Infrastructure & Service

e.g. Roman Sewer

Urban environment

e.g. Passive Cooling

Urban infrastructure & services

e.g. Intelligent Transport

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Cities under pressure: Population growth, aging, urbanization and digitalization

9.75 B

world population in 2050 vs 8.5 B in 2030

2%

Share of land surface occupied by cities

70%

% of people living in urban areas in 2050 vs 55% in 2020

Sources: UN DESA, Intergovernmental Panel on Climate Change, IDC, Organisation for Economic Co-operation and Development, McKinsey Global Institute, Gartner Prepare to Monetize Data From the Internet of Things

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Cities under pressure: how to combine development & environment?

76% of global energy use and carbon emissions are from cities

"Managing urban areas has become one of the most important development challenges of the 21st century. Our success or failure in building sustainable cities will be a major factor in the success of the post-2015 UN development agenda."

John Wilmoth
Director, UN DESA
Population Division

Sources: UN DESA, Intergovernmental Panel on Climate Change, IDC, Organisation for Economic Co-operation and Development, McKinsey Global Institute, Gartner Prepare to Monetize Data From the Internet of Things

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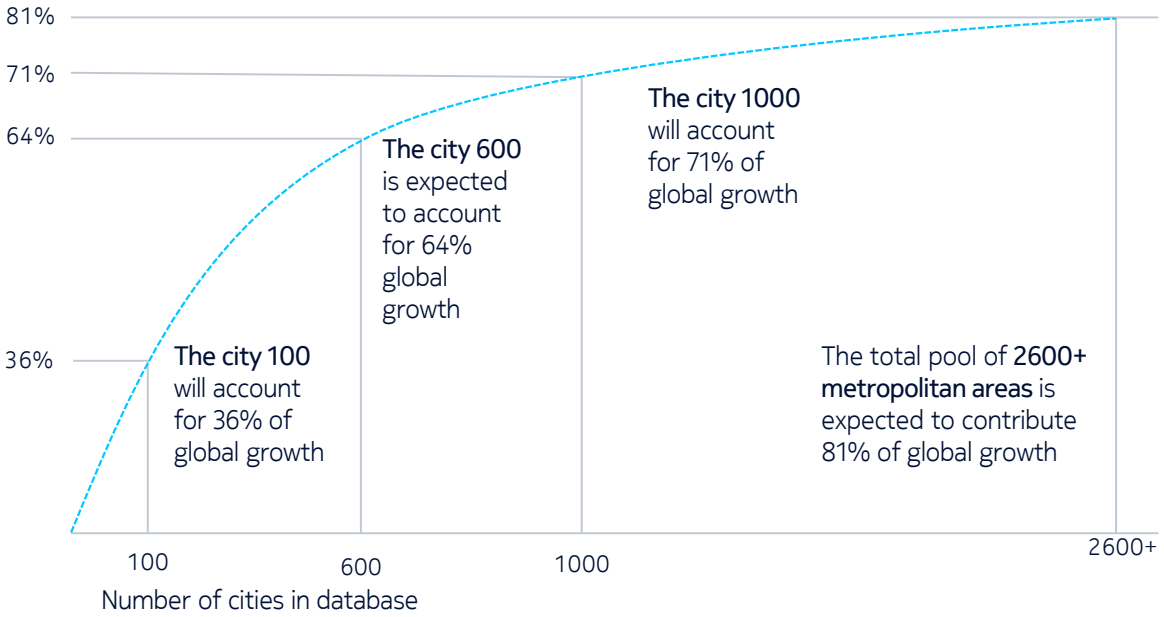
Cities under pressure: Big cities contribution to country growth is essential how do you develop & attract businesses?

Projected cumulative contribution to global GDP growth 2010-2025



Sources: UN DESA, Intergovernmental Panel on Climate Change, IDC, Organisation for Economic Co-operation and Development, McKinsey Global Institute, Gartner Prepare to Monetize Data From the Internet of Things

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A technological disruption…

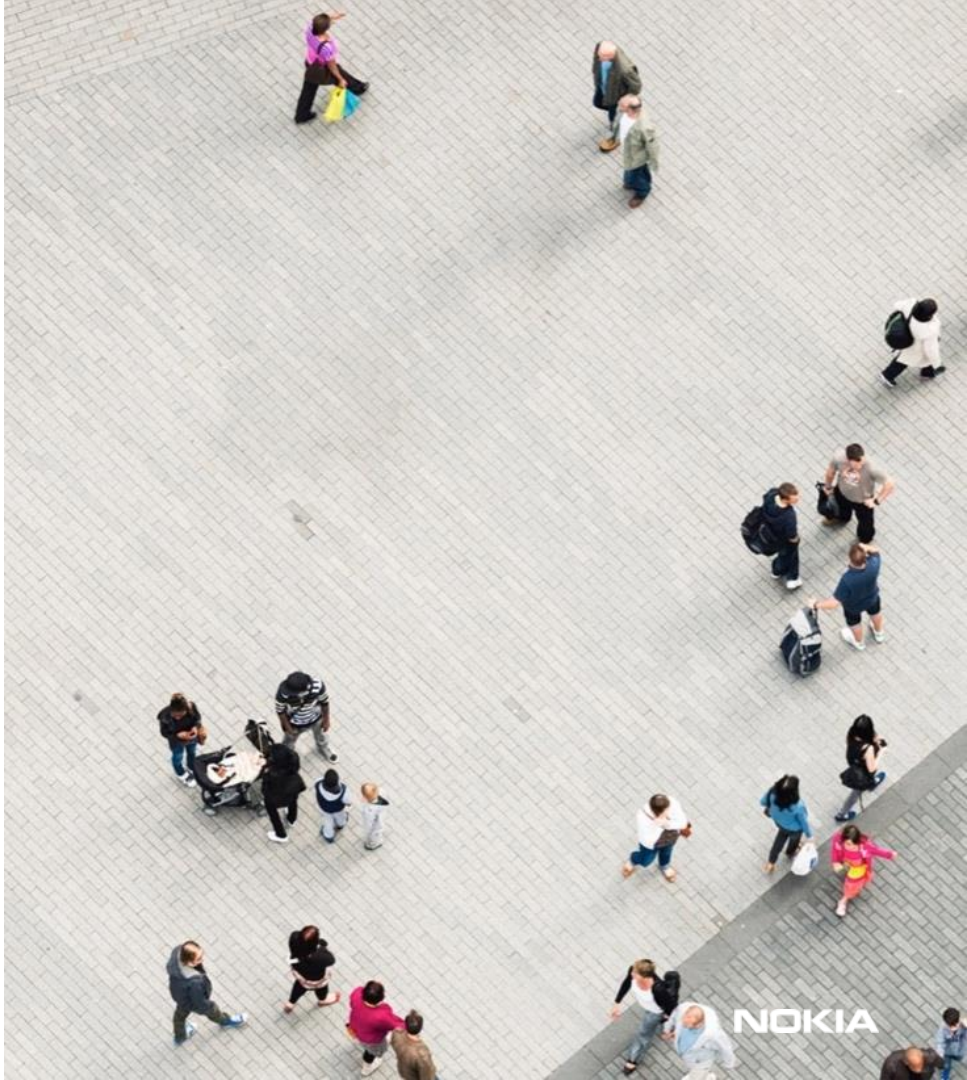
The Internet of things is opening a wide area of possibilities to help cities address these challenges.

… which still looks for the models of execution

Beyond concepts and pilots, how to develop at scale?

How to leverage new IoT based data into actionable intelligence?

Nokia supports governments navigate in this complex (r)evolution to build a sustainable initiative that deliver on its promises.



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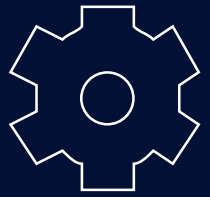
Nokia is leading the way with solutions designed to meet urban needs in four crucial areas:



Urban Infrastructure & Services

Urban Society

Urban Environment

Urban Economy

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Urban Infrastructure & Services

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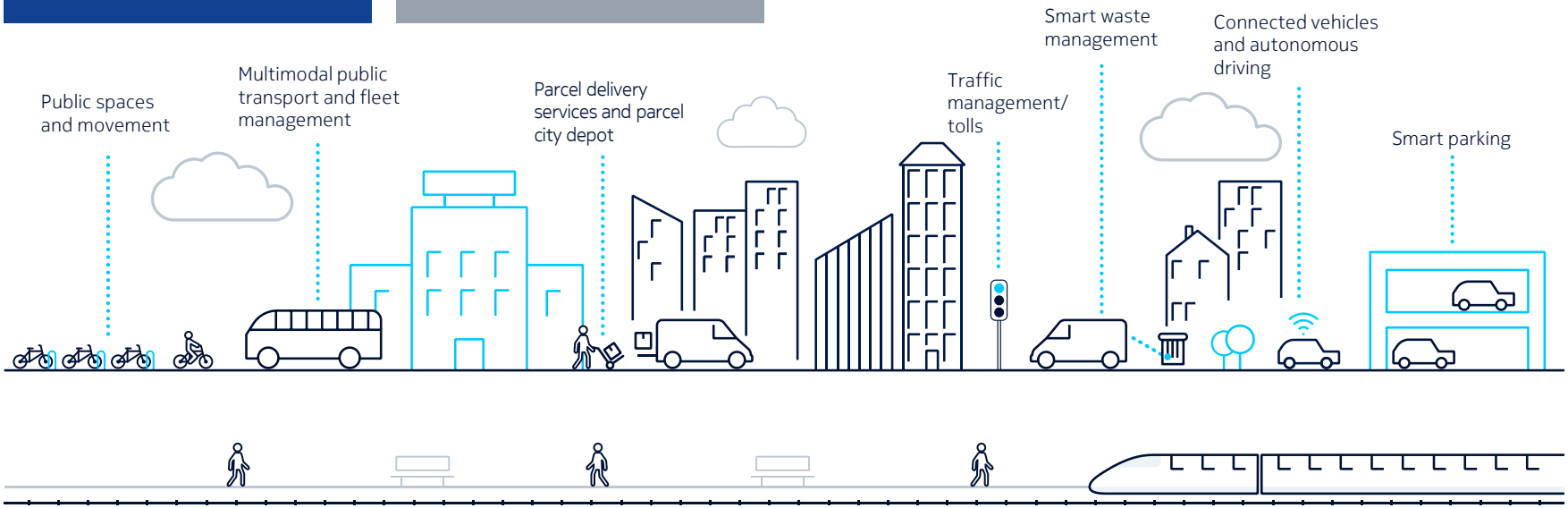
Smart mobility & waste management

Smart mobility

From Urban Traffic Control to Multimodal Sensing & Transport

Smart waste

Connected bins for a more integrated waste



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Urban Society

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Improved city quality of life with new urban social and safety services

Smart public places

improve users experience in stadiums, venues, malls, airports, universities, etc.

Augmented reality & tourism

Enhance user/visitor experience or push sponsored content based on context.

Safe city

Video protection and unified city operation center, to maximize first responders situational awareness

Connected healthcare

Remote patient monitoring and care for more efficient healthcare services

Social inclusion

Develop city games / council loyalty cards to boost social inclusion.

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Urban environment

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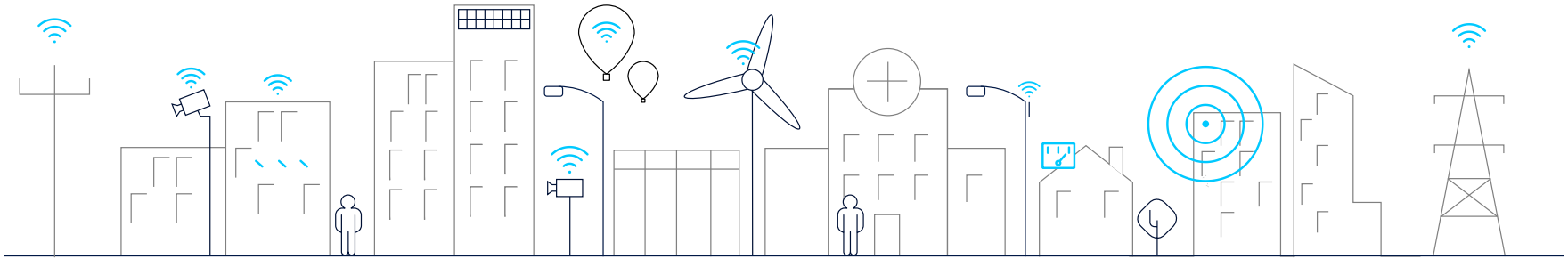
Smart energy services to balance demand response and impact on the environment



Smart building and smart homes

Monitor and tweak resource usage of public buildings.

Smart Light

save up to 60% energy, while providing innovative.

Smart electricity grid

Build a grid which adapts production to storage and demand, based on analysis and prediction of energy consumption.

Water leakage detection and prevention

Detect leakages and analyze consumption patterns to reduce city water bill

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Urban economy

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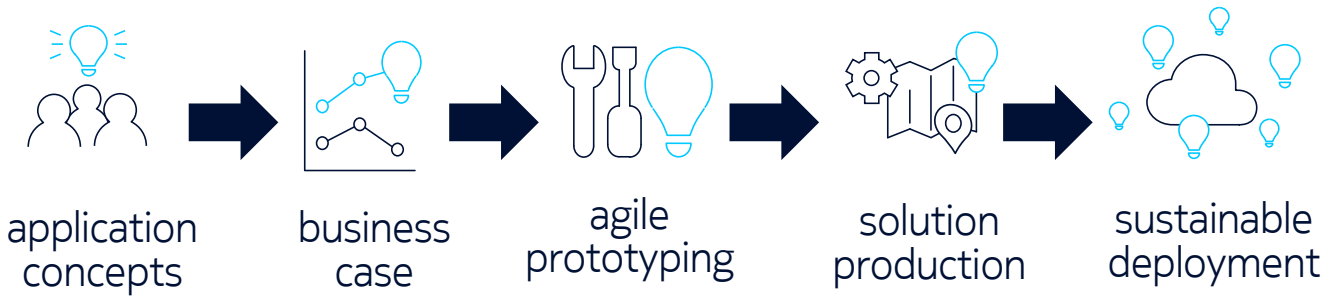
Fostering a broad ecosystem, open data & collaborations are key to develop smart applications and local economy

Open data services

Expose city's data to local eco-system of businesses & start-up

Smart city community program

Innovation eco-system and lab gathering established players and local start-ups/businesses



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Nokia’s approach for a sustainable smart city

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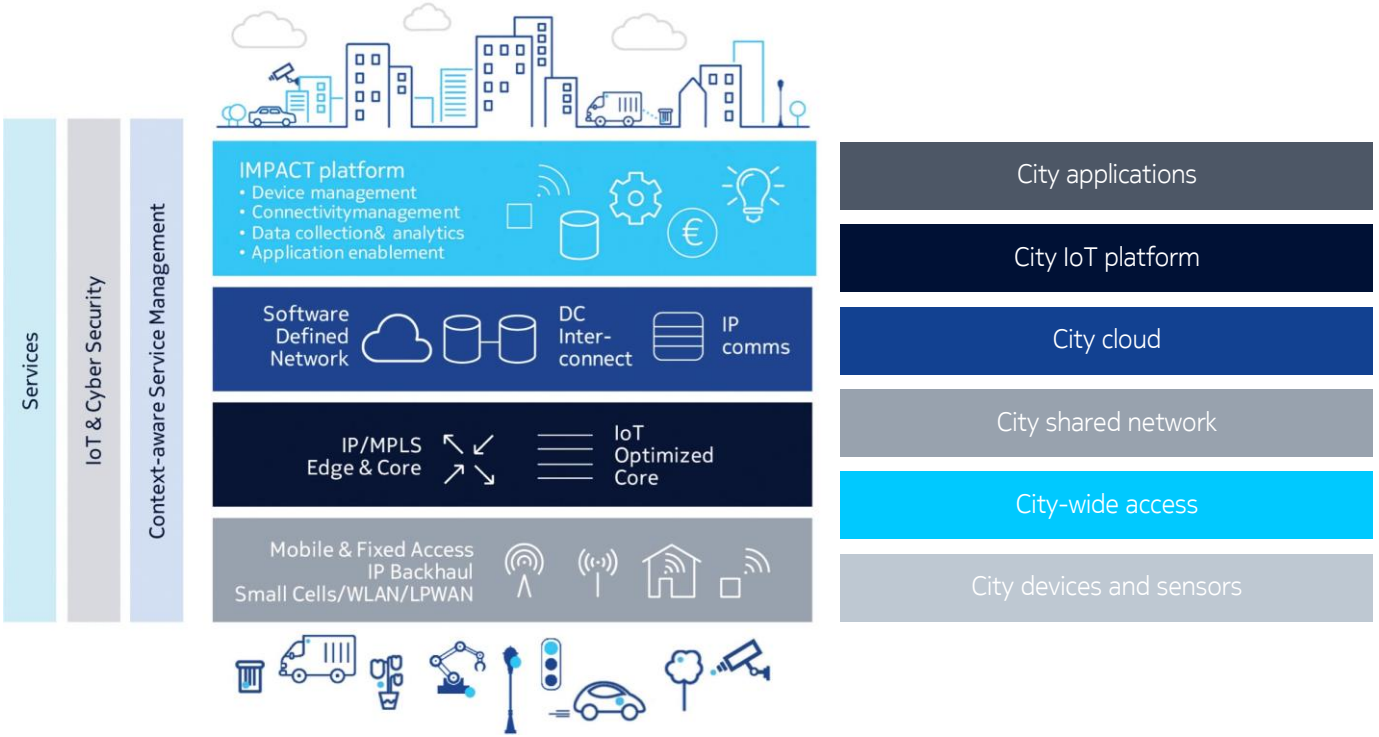
Smart, safe and sustainable cities

Shared, secure, real-time and scalable technologies



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Think horizontal, real time & context aware

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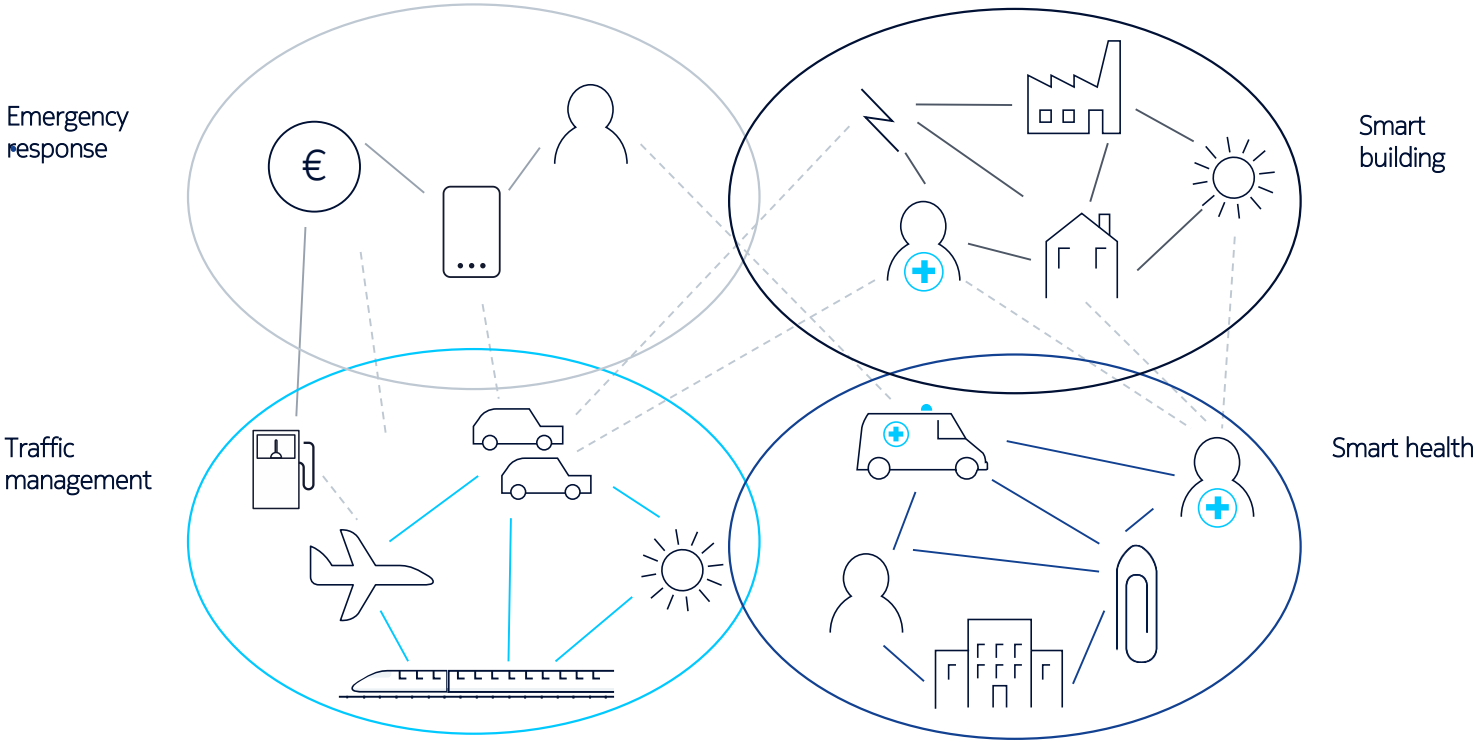
Horizontal networks, IoT platforms & operations from datasets to easy, transparent, in real time context-aware access to intelligence



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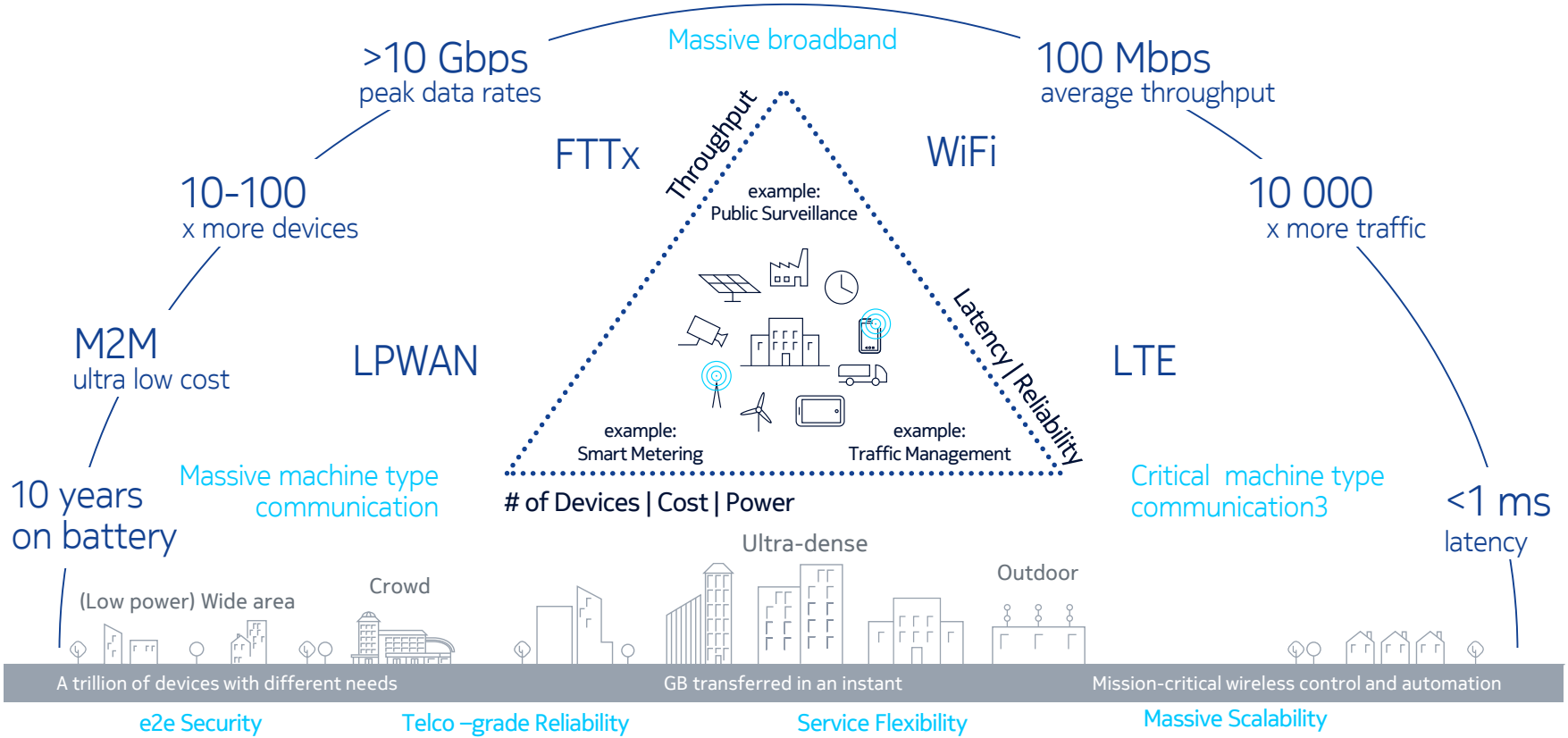
Telecom infrastructure: multiple type of connectivity technologies are needed

Diversity and scale of Smart City use cases poses unique and contradictory challenges on the network



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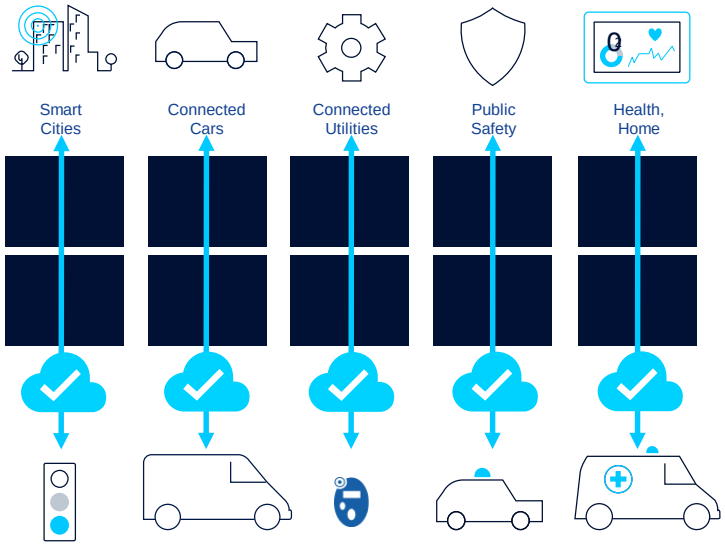
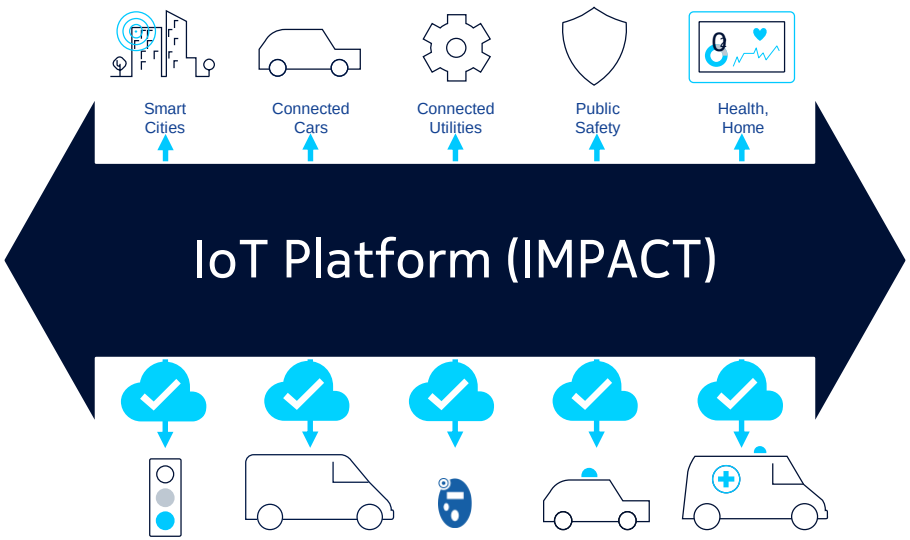
A horizontal approach to enable IoT mass adoption

Secure, Scale, Monetize





Point solutions are limited due to:

- High cost for integration
- Expensive duplication of effort
- Underutilized resources
- Disparate security standards
- Lacking economies of scale

Horizontal approach drives adoption by:

- Promoting best practices by leveraging end-to-end security an scalability
- Streamlining operations to reduce costs
- Monetize IoT by expanding offerings through modular and flexible mix-and-match architecture

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Real-time city dashboard with alerts, from any sensor
Get relevant information, when needed

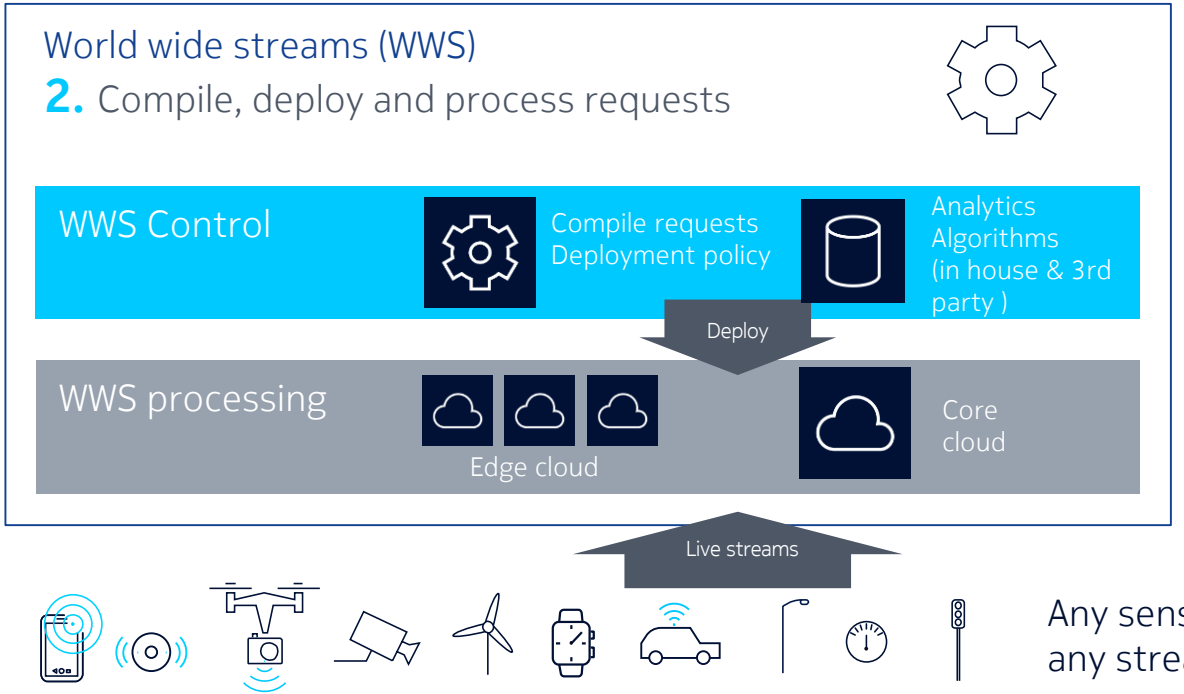
1. Request in user language

i.e: Alert me when yellow car 123 XY is detected in this area

City dashboard

3. Real time Information

Relevant set of streams is delivered



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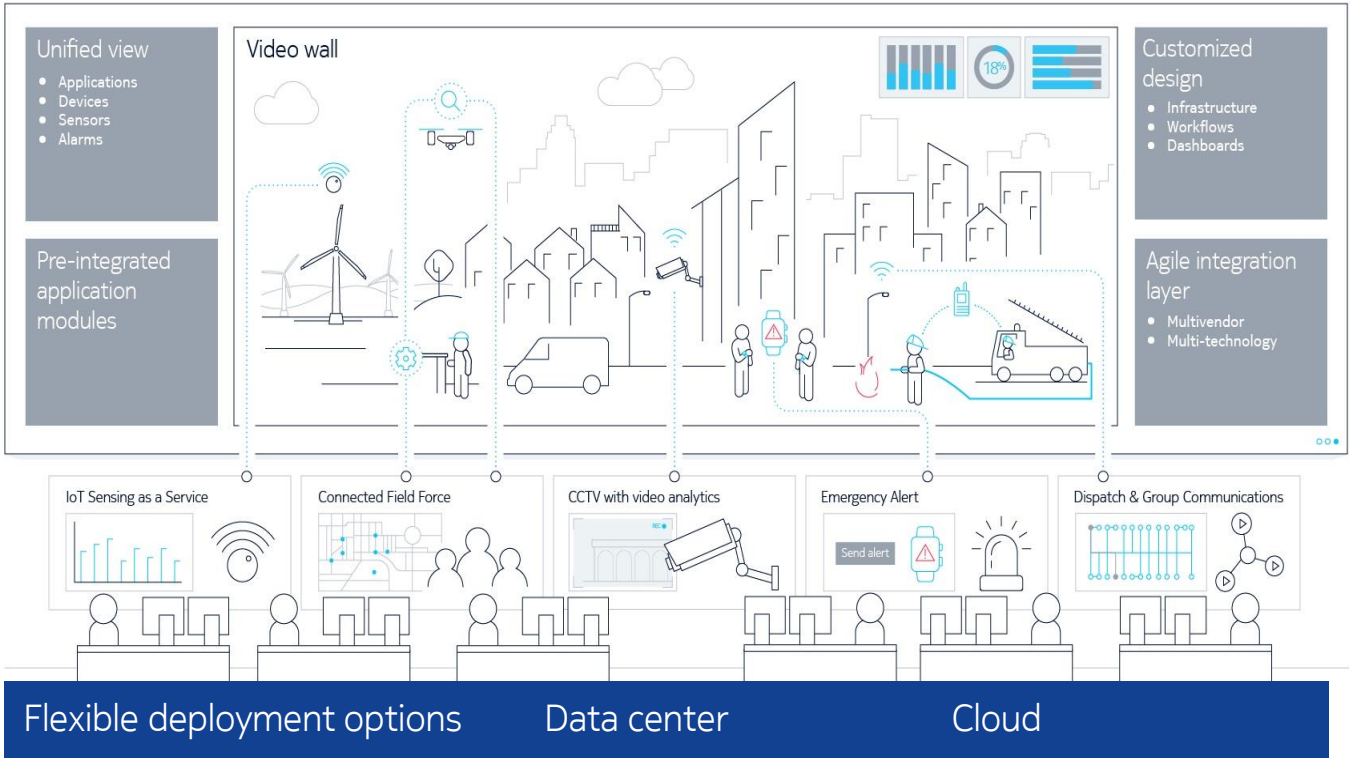
Complete situation management for Smart and Safe cities

Nokia Integrated Operations Center solution



Faster response to emergencies

Improved decision making

Increased operational efficiency

Efficient asset management

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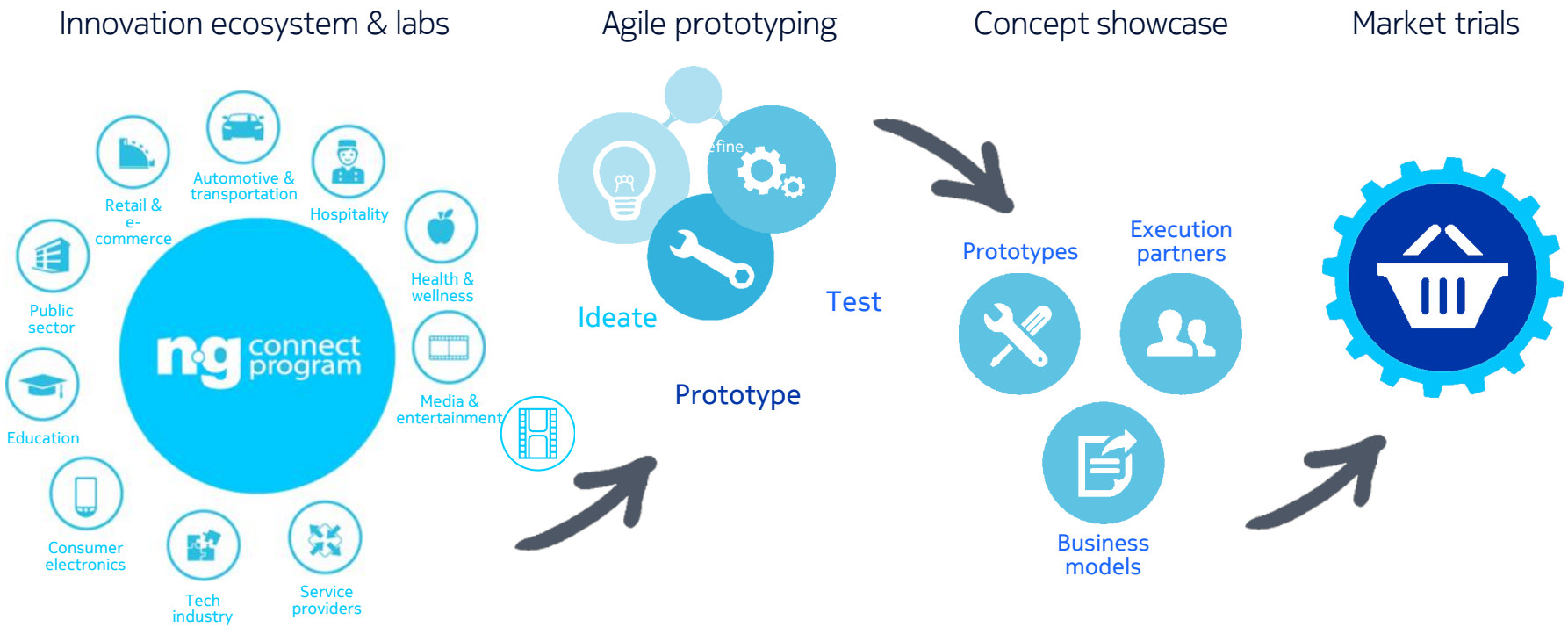
City applications: drive your local economy

Build an ecosystem of trusted partners for a faster path to innovation



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Nokia IoT community

72 member companies spanning a wide range of industries to collaborate, test, and unleash the business potential of the Internet of Things.

Innovation ecosystem

Agile prototyping

Concept showcase

Market trials

For more information: www.iotcommunity.com

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Network infrastructure security & IoT end to end security

Geographic redundant data centers

- Data transfer at fiber speed
- Real-time data encryption with quantum safe centralized key management

1.2+ M known Mirai-infected devices on the web with over 166,000 devices active now

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Inspiring examples

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City response example

Singapore “Smart Nation” initiative: Anticipation, Vision and Execution

Past

NG-NBN

National Fiber Network

Wireless

National WiFi Network

Present

Collect & comprehend

Deploy “operating system” accessible by all stakeholders

Connect

Deploy sensors using above ground boxes for electricity & connectivity

Generalized heterogeneous network boost citizen quality of services

Future

Sustain livability and position Singapore as a (regional) digital harbor to drive economic growth.

Singapore Government ICT Investment

in BSGD (1SGD = 0.65Euro)

Source: IDA 2014

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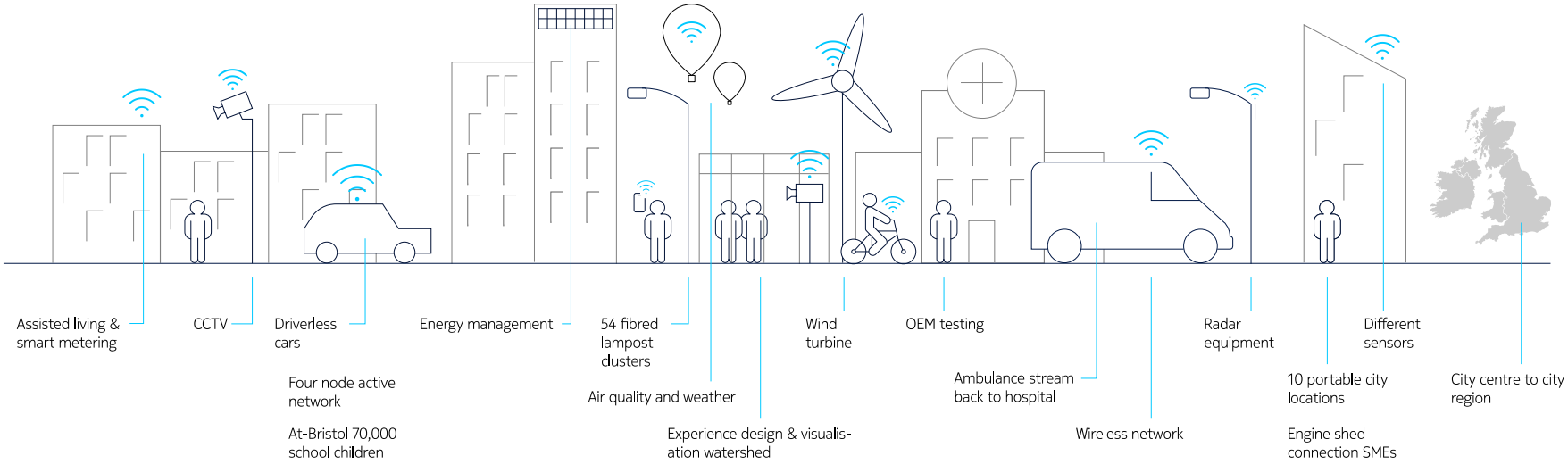
City response example: Bristol open programmable city

Bristol City Council, Bristol University, Partners (Nokia e.a.)



Big data generation

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Competitive differentiation: overcoming challenges

Horizontal approach

Any Service, Any Network, Any Device In Real Time

SECURITY	Authentication, authorization and protection of devices and data
SCALABILITY	Mix & match devices & applications and M2M traffic
MANAGEABILITY	Provisioning, control, management and billing of devices and apps
PERFORMANCE	Optimize protocols & networks for huge loads of small messages – Intelligence at the edge
INTEROPERABILITY	Devices, data formats, protocols, and standards - reduce onboarding cost

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Think vertical - What are your priorities ?

Urban Infrastructure & Services

- Traffic & crowd analytics
- Urban Planning
- Multimodal transport
- Parking & fleet management
- Waste management

Urban Society

- Smart public places
- Augmented reality & Tourism
- Video protection
- Integrated operations center
- Connected health
- Social inclusion program

Urban Environment

- Smart buildings & homes
- Smart lights
- Smart electricity Grid
- Water leakages detection and prevention

Urban Economy

- Local IoT partnerships & innovation labs

& HOW CAN WE HELP YOU?

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