Ростелеком

Smart cities and digital regions

Impacts, outcomes, and references (Russia)

Создаем цифровые регионы

Russia going digital:
More than 700 digital transformation projects implemented since 2017

Much lower street crime rates

due a biggest and most well-developed city CCTV systems globally

Energy consumption lower by up to 80%

for major municipal buildings, city's infrastructure assets, and public lighting systems covered by energy efficiency efforts

30% less time required

to respond to emergencies

Up to 25% fewer traffic accidents/incidents

due to implementing the intelligent transportation systems (ITS) and systems for taking pictures and video recording of traffic violations or incidents

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Технологии возможностей

More than 700 projects carried out, with more than 60 regions covered

Key metrics

The CCTV platform **operates in 9 regions** with **more than 380 k webcams** connected

Emergency response time improved **from 60 to 40 minutes**

Energy saving performance improved by up to 80 % for major municipal buildings and city's infrastructure assets within energy efficiency efforts

The technology ecosystem for regional urban agglomerations offers comprehensive e-solutions for security, urban and traffic management, and comfort so covering the 3 key aspects

THE THREE KEY ASPECTS

Key aspects

Safe cities
Vital facilities and resident interests are robustly protected

Manageability
Municipal utilities, facilities and maintainers controlled and managed by digital technology

Comfort
Residents and other users are happy with the level of urban environment quality (UEQ)

Ростелеком
Технологии возможностей

Today, we have carried out over 700 digital transformation projects to enable smart cities and digital regions in Russia

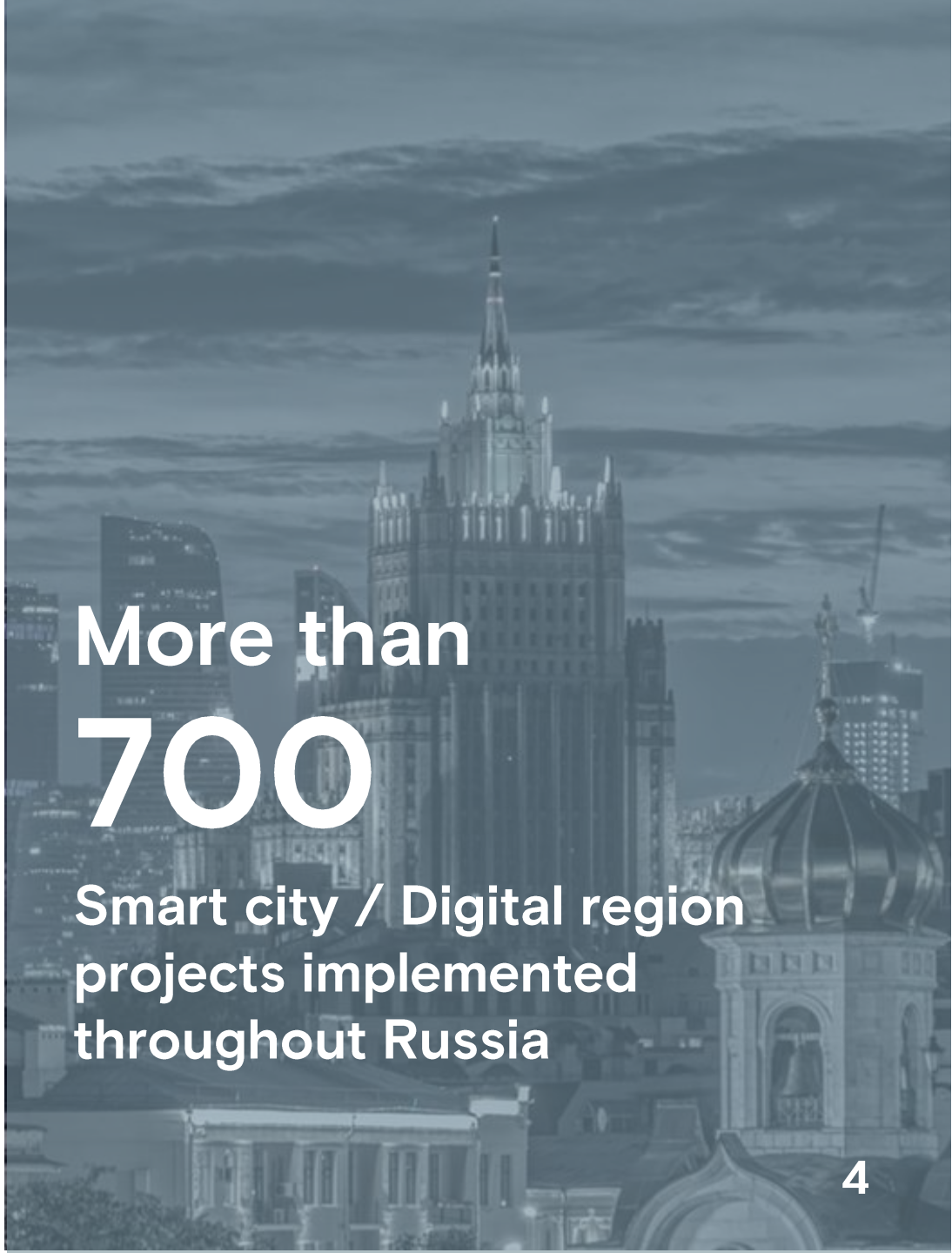
Outcomes

More than 350 k webcams
within the video surveillance platform

Energy consumption lower by up to 80%
for the public and community facilities

Emergency response time improved
from 60 to 40 minutes

Projects to curb and manage COVID-19 to protect more than 30 million people



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Digitization impacts for cities and regions in Russia

Safer cities

National impact

Safe City system by Rostelecom has been implemented by 15 regions
so covering more than 45 municipalities

More than 160 projects
with Rostelecom solutions integrated with or laid over the existing monitoring and analytics systems

112
emergency telephone number for more than 60 regions across Russia

Benefits and outcomes for the Altai Territory

Emergency response time improved from 60 to 40 minutes
For municipalities and regions

40% less or even shorter time required
for switchboard / emergency operators to be alerted about accidents/incidents

30% less deaths
caused by emergencies
or even more people
survive emergencies

Up to 90% greater
emergency prediction accuracy

Arkhangelsk Region

Vologda Region

Moscow

Nizhny Novgorod Region

Altai Territory

Sakhalin

Saint Petersburg

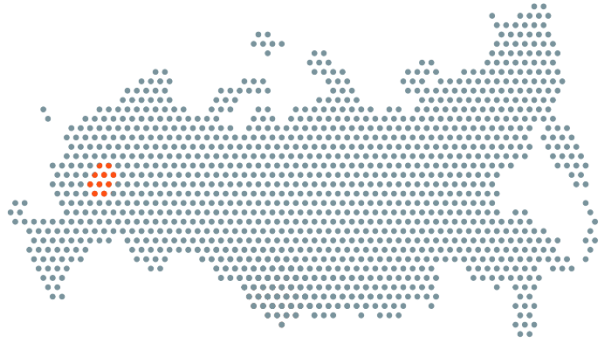
Tyumen Region

Khanty-Mansi Region

and other regions

Smart CCTV for safe city living and manageable regions

Leading regions	Outcomes for Moscow
More than 200 k webcams within the municipal video surveillance platform in Moscow, **41 thousand webcams** within Saint Petersburg's municipal video surveillance system, with **2.5 thousand CCTV cameras** connected to the common system in the Tyumen Region, and **2 thousand cameras** used within the municipal platform in Yuzhno-Sakhalinsk	**Street crime rates lower by 75%,** Moscow IT Department reports **200 thousand emergencies** were attended within a short time **More than 300 thousand** offences in the utilities, housing, utilities, and amenity sector **More than 50 thousand residents** Were able to access video records via government services for investigation and evidence purposes



Moscow

Moscow Region

Saint Petersburg

Nizhny Novgorod

Novosibirsk Region

Tyumen Region

Sakhalin

Khanty-Mansi Region

Yamal-Nenets Region

and other regions

Energy efficiency for cities

National impact

Energy infrastructure modernized in 36 regions with efficient lighting systems and new energy network equipment installed

Electricity meters
to enable automatic energy consumption metering

Data transfer equipment
to gather data from meters for further analysis

Benefits and outcomes

Up to 60% lower
Non-network losses

More than 1 billion kWh saved
By modernizing the public lighting systems

Greater availability of metrics and parameters for electricity and heating networks and functionality for tracking faults and incidents

Lower utility receivables
for similar consumption levels

Altai Territory

Zabaykalsky Territory

Kemerovo Region

Krasnoyarsk Territory

Omsk Region

Perm Territory

Buryatia

Khakassia

Tatarstan

Chelyabinsk Region

and 26 other regions

Housing and utilities – stronger transparency and manageability

National impact	Benefits and outcomes
Registration, inventory taking, certificates and records for residential buildings, houses and utilities and housing infrastructure facilities	**Technical information and data for more than 1 million residential buildings** Integrated into the Common Regional Utilities and Housing Management Platform (E-Utilities and Housing Management)
Common portal/switchboard/customer service telephone number and mobile app for orders and complaints	**More than 400 orders and complaints** processed annually
Automated processes and online client access for Capital Repair Companies and Housing Sector Oversight Authority	**Capital repair management and supervision** for more than 3 thousand multi-dwelling units and residential buildings per year
	More than 1 billion rubles collected in penalties

Moscow Region

Kaluga Region

Yamal-Nenets Region

and other regions

E-Public transport for cities and regions

National impact	Benefits and outcomes
Intelligent transportation systems are now operated **within 18 urban agglomerations**	**Common transport system management platform** for regions with intelligent transportation systems **Better traffic throughput**
Traffic portals and incident registration systems were installed **across 56 areas nationally**	**Up to 25% more** traffic accidents and incidents prevented, with fewer traffic offences logged
Automatic vehicle weight and size control systems are being operated **across 32 regions throughout Russia**	**Federal subsidies to promote ITS** issued for a number of regions and spending budgets proved feasible as part of National project Safe High-Quality Roads

Leningrad Region

Sakhalin

Nizhny Novgorod Region

Bashkortostan

Voronezh Region

Kransnodar Territory

Yekaterinburg

and 50 other regions

Ростелеком
Технологии возможностей

Our solutions portfolio

Smart city solutions for security and safety

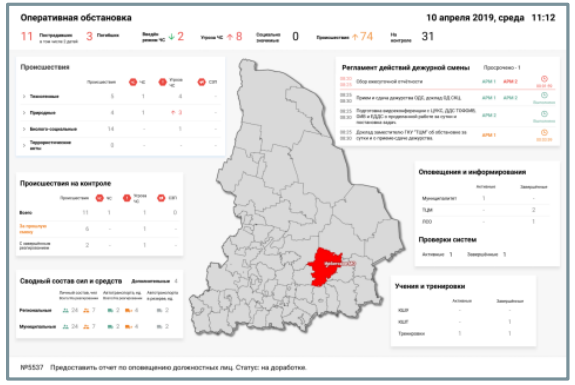
Solutions

Safe City by Rostelecom
Emergency response center enables fast emergency response with complete functionality for security and safety management, and emergency prediction

Common alert system
integrates modernized emergency alert systems, regional alert systems and integrated public address and alert systems

112
emergency telephone number for all types of emergencies

Comprehensive environmental conditions monitoring
Tracking fire, high river levels and condition of forests with an integrated functionality enabling comprehensive monitoring of environmental conditions



Outcomes

Faster emergency response and less or even shorter time required
for switchboard / emergency operators to be alerted about accidents/incidents

Up to 90% greater
emergency detection accuracy for potential emergencies

Shorter emergency response and preparation time
for municipalities and regions

Emergency casualty count
reduced by thirty or more percent (-30% or better)

Higher urban environment quality and safety of living levels

Digitization impact - Improvement aspects

Urban IQ
- Number of offences per 10 k residents
- Mobile emergency alert app

KPIs for governors
- Life expectancy at birth

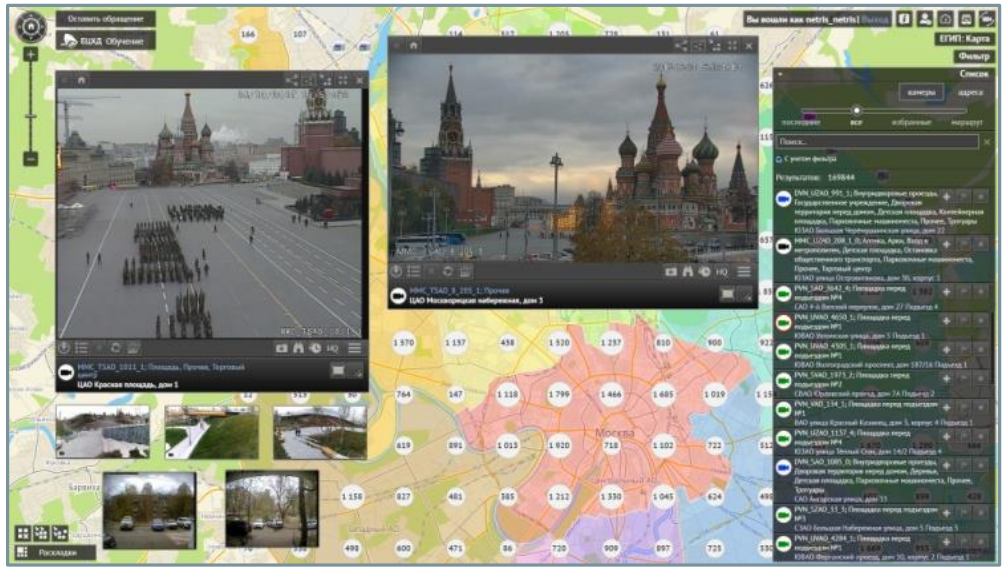
Smart CCTV for digital regions

Solutions

Municipal video surveillance platform
To bring about municipal common CCTV systems to integrate the existing video surveillance equipment, and CCTV networks and circuits

Intelligent video analytics
AI-driven human, edge and event detection, with the capabilities for municipal improvement work and project supervision, and with road and pedestrian traffic counters

E-control modules
for online tracking and supervision



Outcomes

Lower crime rates
due to efficient monitoring and offence prevention

Municipal facility protection,
with the capabilities for tracking the quality and progress of work, detecting violations in the utilities, housing and amenities sector

Access to video records
so people can use them for investigation and evidence purposes

Wide shared functionality for public authorities and agencies

Digitization impact – Improvement aspects

Urban IQ
- Smart CCTV
- Number of webcams within the common system to the municipality size (area)

KPIs for governors
- Urban environment quality (UEQ)

Smart energy

Solutions

E-energy efficiency via government services
To save energy and promote energy efficiency

Smart lighting system
Integrated in- and outdoor lighting systems using LEDs

Smart utility metering (E-Utilities)
Smart utility metering system and intelligent utility management simulation platform

Remote sensors
to monitor building management system and services performance and condition

Modernized heat supply and heat consumption systems
with remote heat consumption controls, up-to-date, efficient heat generation sources and using more cost-efficient fuels

Customer service for network connection
With the common record management system, network connection contract support, functionality for tracking and meeting the agreed timeframes, and calculation of fees

Outcomes

Energy consumption lower by up to 80%
for major municipal buildings and city's infrastructure assets within energy efficiency efforts

Street lighting costs
reduced by 30% at average

Electricity consumption predicted
due to the use of smart meters

Modernized infrastructure

Digitization impact - Improvement aspects

Urban IQ
- Power-efficient public lighting including building and landscape lighting

KPIs for governors
- Urban environment quality (UEQ)

Regional ITS

Solutions

Intelligent Transportation System (ITS)
is an integrated predictive system including traffic sensors, traffic light controllers, traffic webcams and other road infrastructure elements

Traffic offence registration and management
Online traffic offence registration, penalty charge decisions and notices, and penalty and fine payment supervision. Traffic detection at detection points

Vehicle weight and size control
Automatic detection of large or heavy vehicles with the vehicle's weight and size detected in real-time for moving vehicles

Public transport management
Online public transport management platform with the customer section where fares can be paid online

Parking space management
Comprehensive municipal parking space management system including a mobile app and parking meters

Online road surface, road structures and roadside furniture checks
to track road surface conditions, and check road structures and roadside infrastructure by using a wide range or functional equipment

Outcomes

Up to 25% fewer
traffic accidents/incidents

20% fewer
overall traffic offences

Greater traffic throughput

Smart traffic management
and traffic flow prediction

Digitization impact – Improvement aspects

Urban IQ
- Fewer traffic incidents per 10 k residents
- Lower traffic levels
- Smart traffic management system
- Online supervision of road and utility maintenance
- Municipal parking space management
- Road surface monitoring

KPIs for governors
- Urban environment quality (UEQ)
- Adequate road length for major municipalities

Digitizing construction

Solutions

Building activity management system (Digital built)
3D models for capital construction projects with compliance check and user-friendly, convenient viewing, layout and presentation functionality (national standards like GOSTs
and other applicable regulations) , decomposable into sub-models /elements

Digital construction
Ubiquitous digitization across processes and municipal construction procedures

3D simulations and models
Smart simulations and models for building modeling

Outcomes

Precise compliance for construction designers

Design CapEx savings

Shorter design timeframes

Stronger information protection

Digitization impact - Improvement aspects

KPIs for governors

- Households with improved housing conditions
- Residential construction volumes
- Actual capital investment index (excluding investments by infrastructure monopolies (federal projects) and federal financing

E-utilities and housing maintenance

Solutions

E-Capital repair
including a register of multi-dwelling units (MDUs) and preparation of capital repair programs and short-term plans and schedules

Common portal/switchboard/customer service for the sector
providing a common customer service center for orders and complaints for the utilities and housing sector

Resident's Account for multi-dwelling unit (MDU) residents
for residents to be updated about the MDU maintenance and management developments, decisions regarding amenities within the building's grounds and adjacent areas, utility fees and payments, with the functionality for submitting meter readings

Online apartment owner meetings
enables efficient online meetings

E-utility bills
with utilities payments processed online

E-housing maintenance inspections
Common e-system for public inspections

Outcomes

Resident involvement
Enabled, as residents can influence the management and maintenance of the building where they live and participate in online apartment owner meetings

Higher customer satisfaction levels
(better quality of customer service)

More efficient management practices
by using digital business processes for utilities and housing maintenance

Digitization impact – Improvement aspects

Urban IQ
- Online building condition monitoring
- Smart utility metering
- Online apartment owner meetings (at least 50% meetings to be online meetings) with electronic voting

KPIs for governors
- Urban environment quality (UEQ)

Digital maturity
- Percentage of maintainers/management companies providing users with access to all disclosures and information required via the government services
- Percentage of payments processed online for the MDU maintenance and common property management services
- Percentage of online apartment owner meetings with e-voting

E-environment and smart waste management

Solutions

Common medical waste management system
including software and hardware for centralized dry waste collection and tracking medical waste treatment

Environmental monitoring
Comprehensive environmental conditions monitoring

E-SDW (online solid domestic waste management)
provides and comprehensive system for functional monitoring and supervision of the regional SDW disposal practices, including smart SDW treatment simulation for the area or region

SDW landfills
with automated business processes including the data such as incoming waste flows and waste types, and vehicle and carrier logging and data collection

Outcomes

Comprehensive environmental conditions monitoring

More transparent and traceable waste management

Model-, AI- and ML-driven forecasts

Digitization impact – Improvement aspects

Urban IQ

- Online air quality monitoring
- Number of air quality monitoring stations integrated into the common real-time monitoring system to the municipality size (area)
- Online water quality monitoring
- E-waste management

KPIs for governors

- Urban environment quality (UEQ)

Smart solutions for comfortable cities

Solutions

Bus/tram stops

Bus/tram stop shelters:
- CCTV
- Wi-Fi access
- Alerts
- Emergency button
- Geoinformation services
- Interactive screen

Lighting supports

Smart lighting supports:
- Light controls
- CCTV
- Wi-Fi access
- Emergency button
- EV chargers
- Environmental condition sensors

Waste bins and containers

Smart public waste containers with:
- Control software
- Waste compactor
- Solar panels
- Waste level detection
- Interactive ads
- IoT features

Outcomes

Up-to-date technology
and innovative building and space design

Well-designed, aesthetically pleasing infrastructure

Fast emergency response

Greater appeal for travelers

Socially relevant services
integrated with smart city services

Digitization impact – Improvement aspects

Urban IQ
- Public Wi-Fi network
- Percentage of public places and community facilities with free Wi-Fi
- Navigation and Municipal Services for residents and travelers
- Safe and comfortable passenger waiting areas and spaces
- Percentage of smart municipal transport stops
- Car, bicycle and scooter sharing system

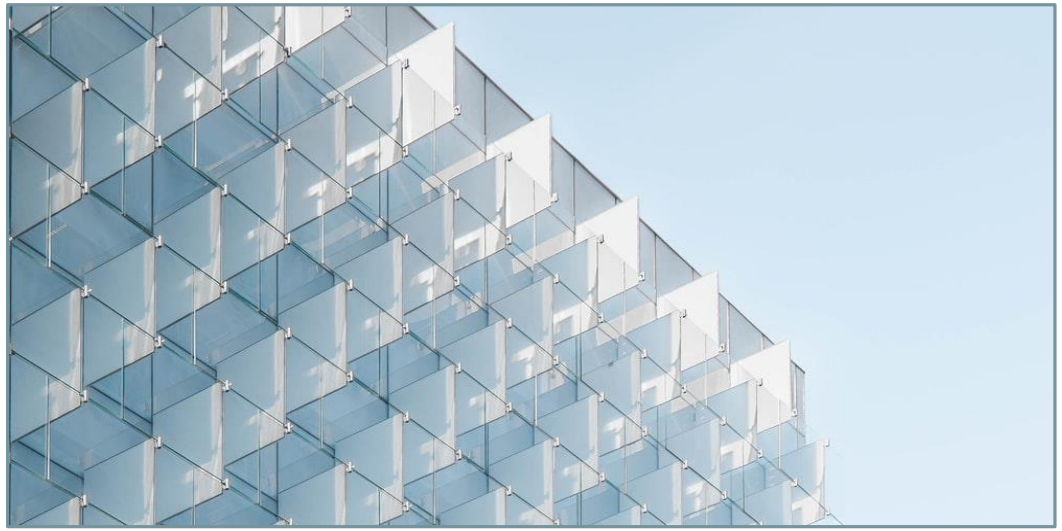
KPIs for governors
- Urban environment quality (UEQ)

Smart region solutions

Solution

Governor's Situation Center
An information and analytics platform for decision-makers used to monitor, analyze, and plan KPIs and key outcomes, and to track progress across assets and sectors, the solution enables automatic decision-making

Key users:
- Regional governments
- Federal agencies
- Local authorities and their teams
- Businesses and institutions across various sectors



Outcomes

Greater manageability levels

Greater amounts and quality of information about the regional developments

Common information platform

More accurate and efficient operational and strategic planning

Less time spent to take management decisions

Digitization impact – Improvement aspects

KPIs for governors
- Resident confidence
- Digital maturity in regional and local public authorities and institutional stakeholders

Digital maturity
- Percentage of electronically available information categories that need to be accessible for the authorities and agencies in providing large-scale public services

Digitization impact – Improvement aspects

Digital transformation aspects	Urban IQ	KPIs for governors	Digital maturity
Smart city solutions for security and safety	+	+	
Smart CCTV for digital regions	+	+	+
Regional ITS	+	+	+
Smart energy	+	+	
E-utilities and housing maintenance	+	+	+
E-environment and smart waste management	+	+	
Smart solutions for comfortable cities	+	+	
Smart region solutions	+	+	+

Ростелеком
Технологии возможностей

Digital regions by Rostelecom – approaches, practices and architecture

Prerequisites for enabling full-scale digital regions

1

Urban IQ (Smart municipal facility management index)[1]

2

Digital maturity levels for key regional sectors and community wellbeing aspects[2]

3

KPIs for governors (Efficiency metrics for regional/federal city governors)[3]

1 – Order No. 924/pr of December 31, 2019 by the Ministry of Construction, Housing and Utilities of the Russian Federation titled *Approval of the Methods for Assessment of the Progress and Efficiency of Digital Transformation in Municipal Facility Management (Urban IQ Assessment).*

2 Orders Nos. 600 and 601 of November 18, 2020 by the Ministry of Digital Development, Communications and Mass Media of the Russian Federation respectively titled *Approval of the Methods for Calculating Targets for the* Digital Transformation *National Development Goal* and *Approval of the Methods for Calculating Estimated Targets for the* Digital Transformation *National Development Goal.*

3 – Executive Order No. 68 of February 4, 2021 titled Performance Assessment for Local and Regional Governors and Governments in the Russian Federation.

Digital regions – Best Russian and global practices

1

With **services** implemented **as an ecosystem**,
we can use the same regional and national standards,
communicate efficiently with clients, and analyze big data

2

AI
Intelligent video surveillance (IVS), edge and human detection, event and emergency simulation, and municipal development and maintenance forecasts

3

IoT solutions
With connectible and interoperable user equipment, ITS can be built alongside with energy savings and effective energy consumption distribution, and manage municipal assets and operation of their maintainers

4

Digital twins
offer digital modeling and geolocation analytics and provide the solution whose adoption helps solve many tasks in many areas including urban planning and emergency response automation

5

Products based on multipurpose technology
such as Big Data, and neural or wireless technology

6

Everything As A Service (XaaS)
Customized services with low customer spending and a wider choice of options to grow value

Digital regions by Rostelecom – Proven projects and versatile track record

Architecture

Common regional digital platform

Connectible, interoperable ecosystem

External data acquisition equipment

Rostelecom's role in delivering projects

1 **Delivers a complete telecom and IT infrastructure**
including smart city ecosystem components, communication channels, data centers, and information protection solutions

2 **Overlaying, complementing**, and flexibility
by working together with other companies when needed, including with regional businesses and developers, government-owned corporations, startups, and other stakeholders and contractors

3 **End-to-end service (turnkey projects)**
with a ready-to-use system or software solution commissioned that is to be owned by a municipality

4 **Delivers digital ecosystem platforms**
such as Common Regional Information and Analytics System, Common Regional Biometrics System, Business Intelligence (BI) System, Government Services
(E-Government), and XaaS

Digital services architecture

Level 1

Digital infrastructure

shared with the federal government and business

Level 2

Data

generated by applications and users

Level 3

Orders, Services, and Reports

customized by clients and the Government

Level 4

Clients and interfaces

Residents, businesses and municipal authorities/ managers

Digital region – Connectivity and interoperability across solutions

Showcase – Smart public transport stops

Comfort

- Wi-Fi access points
- E-schedule
- Interactive geoinformation services
- Order taxi online

Safety

- Public-safety answering point (PSAP)
- Alerts
- City's CCTV

Manageability

- Traffic video analytics
- Public transport supervision
- Interactive ads