Smart City Monitor: The technology enabling digital transformation in Metropolitan and Industrial Areas

GOLEM Integrated Microelectronics Solutions GMBH, Vienna, Austria

▷ [The company](#) is R&D&I SME, established 1991

▷ Expertise in implementation of advanced ICT projects

▷ Implementation ICT prototype platform Pharos Navigator ® for design, prototyping, experimenting, learning, development and operation of complex application systems

▷ Multidisciplinary development team in system sciences, mathematics, software/web programming, design, training

▷ Long term international collaboration with

[United Nations Industrial Development Organization](#) (UNIDO)

OVERVIEW: METROPOLITAN DYNAMICS

▷ **Change** accelerates in technologies, demand, supply, value-chains, knowledge, quality, standards, requirements, environment, climate, markets, etc

▷ **Complexity** of Everything grows exponentially

▷ **Smart Everything** penetrates everywhere

▷ **Smart Systems interlinkages** add Complexity

▷ **Uncertainty** is increased by the Complexity

▷ **Sustainability** long term prospects are impacted by all the factors combined

Metropolitan areas / Smart Cities: The concept status

▷ The visions are fragmented (Energy Grids or Intelligent Transportation or Security, Safety or Waste or Water …)

▷ No holistic view to complex Metropolitan Processes

▷ No "Just right" single solution for all, each one is unique (!)

▷ Experiments run by pioneers risking significant investments

▷ Only large cities experimenting (Amsterdam, Barcelona, Milton Keynes, etc); Most of mid/small cities are aside

▷ Only technical focus does not improve Quality of Life

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The urban technology Smart City Monitor enables holistic vision of Metropolitan Areas as a complex dynamic System of Systems based on its smart model running in cloud

1.
Smart City Monitor to make and run advanced models of Urban Areas

THE OFFER TO URBAN COMMUNITIES

THE OBJECTIVES

▷ Common platform for sustainable inclusive development in green metropolitan areas, circular economy and industries.

▷ Enabling integrated transparent vision of urban processes in real time

▷ Experimenting with new attractive business and investment models

THE OBJECTIVES:

▷ Selecting best results with min costs and risks, quick prototyping of smart ideas, learning

▷ Improving quality of life for citizens, tourists, businesses and attract investments

▷ Increasing citizens' involvement and participation in metropolitan life

▷ Fostering new competitive digital services, connectivity, international standards (ISO 37120, etc)

UNDERLYING CONCEPTS:

▷ Enabling digital transformation of complexity into simplicity and transparency of the vision of ongoing urban processes

▷ Creating an Open Urban Model of a metropolitan area as complex cyber-physical system of interlinked smart systems

▷ Providing interactive instruments for easy advancing of customized urban models, it's adapting to change, maintenance

▷ Enabling high productivity in development of large urban models and its' quick updates without low level programming

▷ Easy linking to necessary data streams from smart systems, IoT, sensors, SCADAs, ERPs, MES, databases, etc

▷ Enabling optimization, command and controls, rich analytics

2.
MAKING THE URBAN MODELS:

WITH SMART CITY MONITOR PLATFORM

Metropolitan area model prototyping cycle

1. Detailed analysis and synthesis of the target urban area model concepts, its planning and documenting
2. Fostering compliance to international standards (ISO 37120, etc)
3. Model development with high level tools without programming
4. Linking of the model to real metropolitan data sources and controls
5. Testing the computer model of metropolitan area on-premise or in-cloud, its running enabling digital transformation
6. Monitoring, analyzing, benchmarking the results by evidence data
7. Simulating options, scenarios, finding optimized decisions
8. Learning, improving, advancing the model for novel digital services

THE CITY AS COMPLEX CYBER–PHYSICAL SYSTEM

THE MODEL EXAMPLE

HIERARCHICAL STRUCTURE TO COPE WITH COMPLEXITY
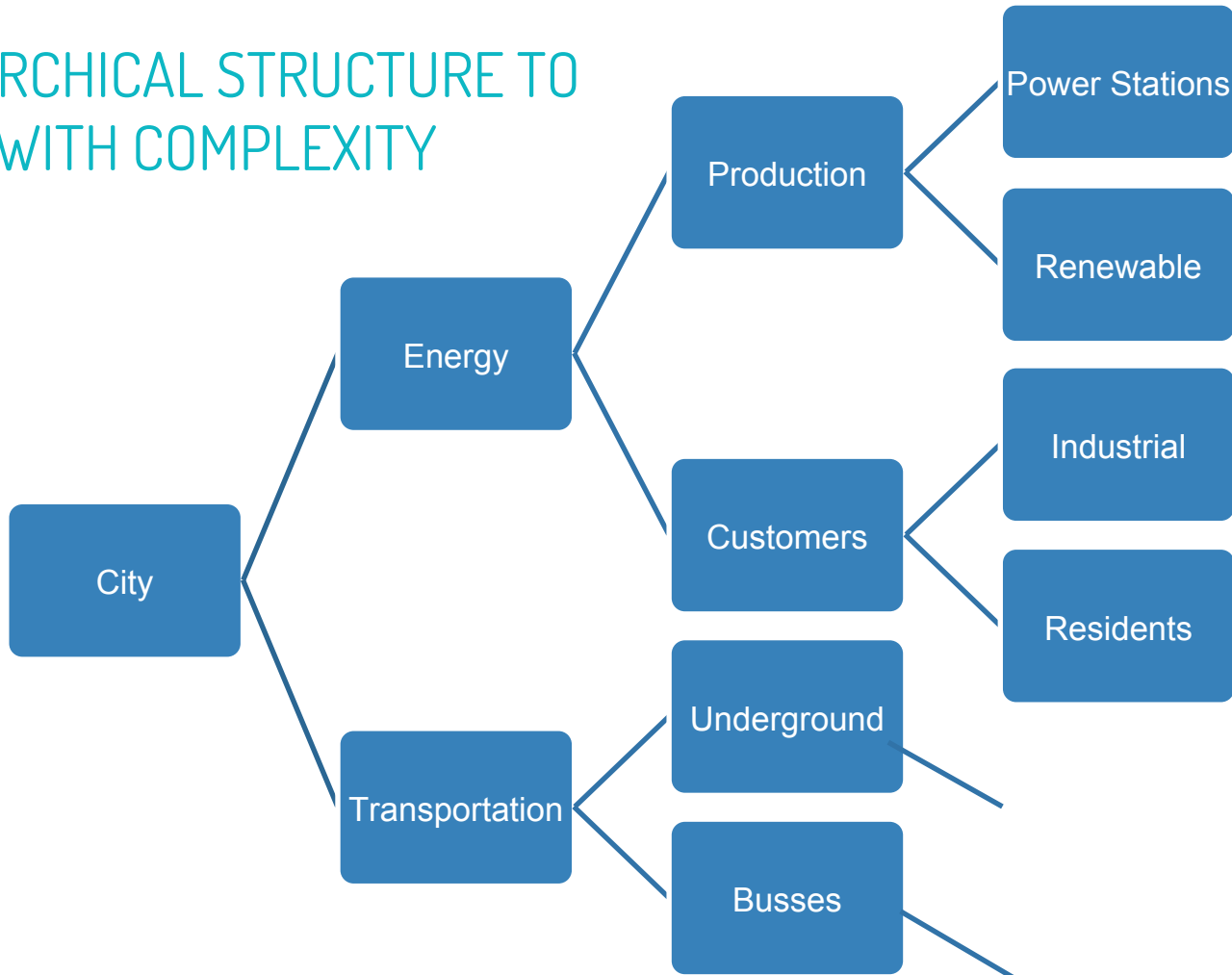
Making initial model of urban area accordingly to ISO 37120 Themes of City Services and Indicators of Quality of Life

Themes of City Services and Quality of Life by ISO 37120

Economy
Education
Energy
Environment
Finance
Fire and Emergency
Response
Governance
Health
Recreation

Safety
Shelter
Solid Waste
Telecommunications and
Innovation
Urban Planning
Transportation
Wastewater
Water and Sanitation

The model structure is open to local definitions of urban infrastructure, life processes, topology, technologies, natural resources, data sources, controls, etc

MODEL OF METROPOLITAN CYBER-PHYSICAL SYSTEM:

The model has the structure of nodes presenting concrete Urban Area objects and processes, its states, indicators, dependences, data sources, controls, reports, dashboards and interactive tools for analysis, simulation and information

Urban Model Structure

Each smart node of the Model may have own customized smart sub-structures, indicators, data sources, other properties

The model can include any KPIs required by major international standards, compliance to quality requirements and certification

The model structure is defined accordingly to the target scheme of operational processes, topology and other requirements existing in particular urban area

STANDARD PROPERTIES of NODES in METROPOLITAN MODEL:

Name as text
Pictures, Videos, Icons, Virtual reality, Augmented Reality
Standards summary
Tags - keywords, attributes, applications
Text descriptors, URL, etc
International Classification
Optional states (e.g. Good, Normal, Bad, Deficient)
Smart sub-objects, inheritance

Indicators
Data elements
Constants: geo-coordinates, tax …
Sensors
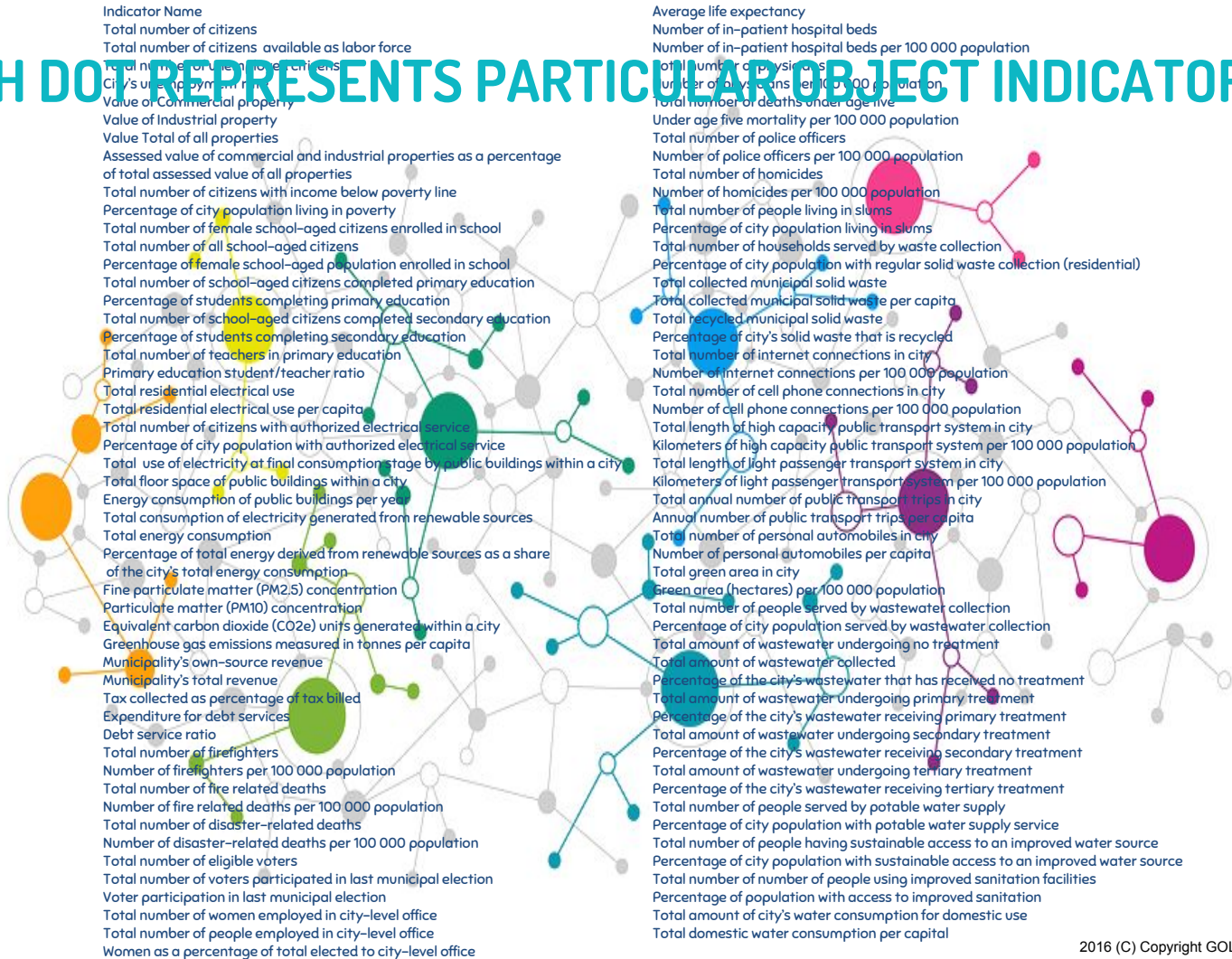Video Cameras
Energy sources
Reports providing views to processes
Rules of state calculation depending on states of its Indicators and sub-objects

The model can have any number of indicators related to its nodes which define its statuses and present dependencies

Indicator Name
Total number of citizens
Total number of citizens available as labor force
Total number of unemployed citizens
City's unemployment rate
Value of Commercial property
Value of Industrial property
Value Total of all properties
Assessed value of commercial and industrial properties as a percentage of total assessed value of all properties
Total number of citizens with income below poverty line
Percentage of city population living in poverty
Total number of female school–aged citizens enrolled in school
Total number of all school–aged citizens
Percentage of female school–aged population enrolled in school
Total number of school–aged citizens completing primary education
Percentage of students completing primary education
Total number of school–aged citizens completed secondary education
Percentage of students completing secondary education
Total number of teachers in primary education
Primary education student/teacher ratio
Total residential electrical use
Total residential electrical use per capita
Total number of citizens with authorized electrical service
Percentage of city population with authorized electrical service
Total use of electricity at final consumption made by public buildings within a city
Total floor space of public buildings within a city
Energy consumption of public buildings per year
Total consumption of electricity generated from renewable sources
Total energy consumption
Percentage of total energy derived from renewable sources as a share of the city's total energy consumption
Fine particulate matter (PM2.5) concentration
Particulate matter (PM10) concentration
Equivalent carbon dioxide (CO2e) units generated within a city
Greenhouse gas emissions measured in tonnes per capita
Municipality's own–source revenue
Municipality's total revenue
Tax collected as percentage of tax billed
Expenditure for debt services
Debt service ratio
Total number of firefighters
Number of firefighters per 100 000 population
Total number of fire related deaths
Number of fire related deaths per 100 000 population
Total number of disaster–related deaths
Number of disaster–related deaths per 100 000 population
Total number of eligible voters
Total number of voters participated in last municipal election
Voter participation in last municipal election
Total number of women employed in city–level office
Total number of people employed in city–level office
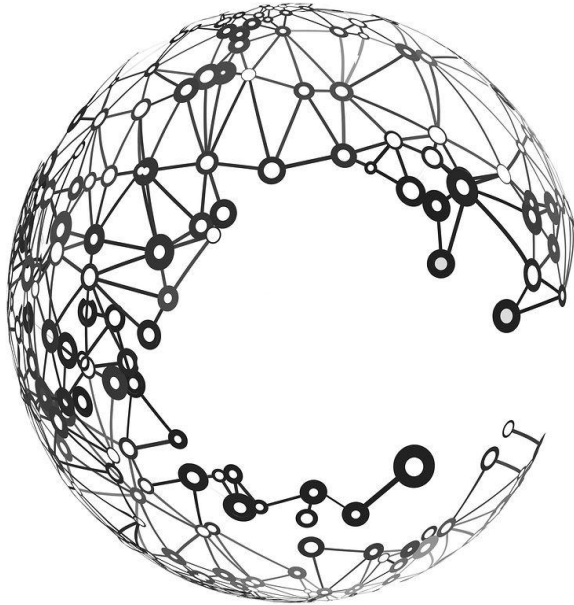Women as a percentage of total elected to city–level office

Average life expectancy
Number of in–patient hospital beds
Number of in–patient hospital beds per 100 000 population
Total number of physicians
Number of physicians per 100 000 population
Total number of deaths under age five
Under age five mortality per 100 000 population
Total number of police officers
Number of police officers per 100 000 population
Total number of homicides
Number of homicides per 100 000 population
Total number of people living in slums
Percentage of city population living in slums
Total number of households served by waste collection
Percentage of population with regular solid waste collection (residential)
Total collected municipal solid waste
Total collected municipal solid waste per capita
Total recycled municipal solid waste
Percentage of city's solid waste that is recycled
Total number of internet connections in city
Number of internet connections per 100 000 population
Total number of cell phone connections in city
Number of cell phone connections per 100 000 population
Total length of high capacity public transport system in city
Kilometers of high capacity public transport system per 100 000 population
Total length of light passenger transport system in city
Kilometers of light passenger transport system per 100 000 population
Total annual number of public transport trips in city
Annual number of public transport trips per capita
Total number of personal automobiles in city
Number of personal automobiles per capita
Total green area in city
Green area in hectares per 100 000 population
Total number of people served by wastewater collection
Percentage of city population served by wastewater collection
Total amount of wastewater undergoing no treatment
Total amount of wastewater collected
Percentage of the city's wastewater that has received no treatment
Total amount of wastewater undergoing primary treatment
Percentage of the city's wastewater receiving primary treatment
Total amount of wastewater undergoing secondary treatment
Percentage of the city's wastewater receiving secondary treatment
Total amount of wastewater undergoing tertiary treatment
Percentage of the city's wastewater receiving tertiary treatment
Total number of people served by potable water supply
Percentage of city population with potable water supply service
Total number of people having sustainable access to an improved water source
Percentage of city population with sustainable access to an improved water source
Total number of number of people using improved sanitation facilities
Percentage of population with access to improved sanitation
Total amount of city's water consumption for domestic use
Total domestic water consumption per capital

# EACH DOT REPRESENTS PARTICULAR OBJECT INDICATOR

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Green area (hectares) per 100 000 population
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Percentage of population with access to improved sanitation
Total amount of city's water consumption for domestic use
Total domestic water consumption per capital

ANALYZING THE COMBINATION OF SUCH INDICATORS

The NODES are defined and act as SMART OBJECTS

- Hotels
- Stores
- Sport objects

- Schulbücherei d. BG Villach
- Galerie Unart
- Kremlhoftheater Villah

After initial ISO model is in place and connected to open data streams, the local Smart Team gradually advances comprehensive urban area model adding major smart objects, its details, indicators, IoT, actuators, sustainability conditions.

While UA model runs, the platform artificial intelligence controls sustainability conditions and reveals results of ongoing processes providing rich information to civic stakeholders.

- Governance
- Health
- Safety

Pharos Navigator
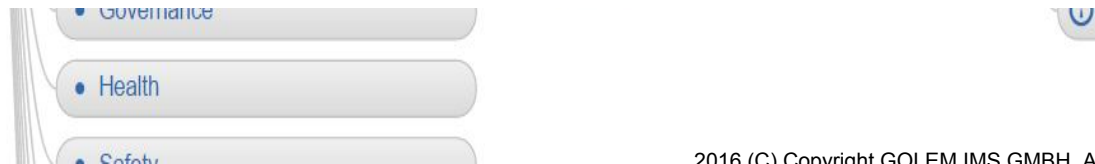
DATA SOURCES:

Sensors
Video cameras
Internet of Things
Automated control systems
SCADAs, ERPs, MES, etc
Open Databases
Web sites
Social networks

Anything generating data
streams ...

Each IoT can be easily linked to the relevant node in the model (RESTful, CoaP, MQTT, etc).
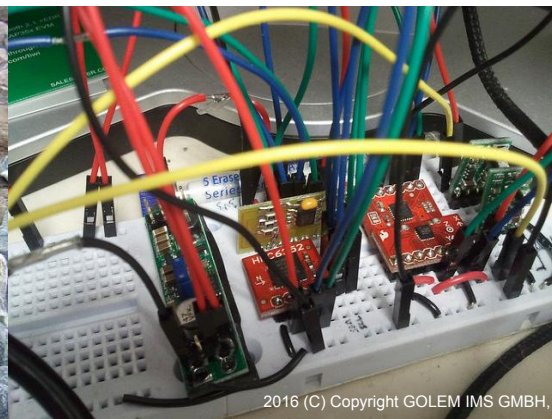
BIG DATA STREAMS from ALL DATA SOURCES Citizens, Employees, Workplaces, Machinery, Logistics, Buildings, Traffic, Safety, Environment, Energy, Public Services:

▷ Shall be processed in real time

▷ Answer to the needs of each stakeholder and process

▷ Support diverse roles of all stakeholders such as: a citizen, tourist, business service provider, urban service specialist, community manager and employee, planner

▷ Be easy personalized and customized for high quality of life and operations (search, procedures, instructions, quality measurements, statistics, analytics, predictive options, etc)

▷ Correspond to planned operational procedures
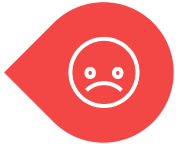
In a Smart City as
Complex Cyber–Physical System the big
data streams shall be transformed into:

Simple, easy understandable human perceptions and images acceptable to all ages and community groups

WHAT IS THE
CURRENT STATUS OF
OUR CITY?

OR

SUBSYSTEMS in
ENERGY,
WATER,
WASTE
TRANSPORT, etc
…

EXCELLENT!

OPTIMAL.

DEFICIENT?

3.
SMART CITY MONITOR:

REAL TIME CITY WEB SERVICES TO METROPOLITAN
COMMUNITIES AND DIFFERENT STAKEHOLDER GROUPS

Customized views to selected metropolitan objects providing its current status, access to quantitative data, pictures, videos, maps, ongoing events, interactive dashboards, reports, alarms at mobile devices

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THE PLATFORM:

▷ Runs the urban model in cloud or on-premises transforming multiple big data streams into simple human vision of complex urban processes and its results

▷ Sends personalized information about ongoing processes to registered mobile devices of authorized civic stakeholders

▷ Supports urban planning as uninterruptible operation, simulation decisions, optional responses and controls

▷ Supports learning and operating the urban processes

▷ Enables flexibility to restructuring and change of operations

REAL TIME SERVICES TO CIVIC STAKEHOLDERS:

▷ Smart "on the fly" analyzing of ongoing processes and results

▷ Monitoring, benchmarking, analytics, transparency of operations by each stakeholder individually

▷ Smart digital interactions "Citizen - Smart Objects"

▷ Citizens involvement into advancing of urban life quality

▷ Preemptive/Predictive maintenance and condition monitoring using evidence data and controls

▷ Diverse mobile apps based on real time and evidence data

COMPLIANCE TO STANDARDS:

The unified solution for diverse applications
- ▷ Supporting process measurement, monitoring, analysis, benchmarking, data collection, evaluation of risks and optional scenarios of change
- ▷ For compliance to relevant international standards requiring measurement, management of performance and quality

ISO 37120, 37xxx, 9000, 9001, 14000, 15504, 17025, 19011, 26000, 50001, etc

TRYING & PLAYING WITH THE URBAN MODELS:

The real life models of a city with 50,000 citizens and one of its industrial enterprises running online

DEMO in VIDEO or INTERACTIVE MODES:

at portal http://pharosnavigator.com or http://win2biz.com

▷ Running Smart City and Smart Enterprise

▷ Making the model and its indicators

▷ Analyzing the dependencies

▷ Adding sensors and video cameras to Smart Objects

▷ etc

4.
ENABLING DIGITAL SERVICES

Smart Urban Governance, Command & Control
Utility services management and operations
Local businesses (B2B, B2C)
Citizens' interaction with city services
Citizens participation in urban life
Tourists and visitors

CONTROL AND COMMAND FOR UNIFIED MANAGEMENT

▷ Various levels of operational management by local authorization

▷ Comprehensive integrated information about city processes in real time (indicators, object statuses, video streams, pictures, events, alarms, predictive analytics, benchmarks, statistics, quality of services)

▷ High level of customization to existing structure of administrative processes and operational requirements

▷ Flexibility and adaptability to actual needs, urban structure, available personnel, workload, districts management

▷ Use of common computer devices, notebooks, personal tablets, mobiles, screens, existing networks

▷ Minimized cost of ownership, upgrading

▷ Operational mobility critical to rapid decision-making

CONTROL AND COMMAND IN URBAN INFRASTRUCTURE MANAGEMENT

▷ Holistic performance of the city and each of its areas accordingly to international standards for Quality of Life (e.g. ISO 37120, etc)

▷ In depth operational monitoring and analysis of the city performance and quality of services by utility providers including cause – impact investigation for the optional issues the history of events

▷ Big data mining and analytics supporting prompt evaluation of trends (demand, supply, quality of services)

▷ Vision of activities, statuses and performance of urban objects on maps, objects locations, by object types, focus groups, projects, dashboards

▷ Customized urban model structure presenting any focus object existing in the urban area in any necessary detail including facilities, buildings, providers, suppliers down to elementary technical components (teams, machines, trucks, pumps, SCADAs, operations and processes, locations)

CONTROL AND COMMAND IN URBAN INFRASTRUCTURE MANAGEMENT

▷ Easy changeability of urban model structure, adding / deleting / replacing necessary urban objects (intelligent and moveable), its integration by connecting to their independent control systems (accordingly to bilateral agreements between the City and relevant organization owners)

▷ Customized data sources for particular objects, its adding or removing, data import / streaming including automatic control systems, smart utility meters, smart streetlights, IoT, sensors (e.g. humidity, CO2, O2, UVA and UVB light, particulate matter, motion, seismic, sound, etc), databases, webs

▷ Wide support of many city services from law enforcement to environment, transportation oversight and earthquake preparedness

▷ Adding video streams and snapshots for particular urban objects or areas to be controlled manually or automatically upon specific events

CONTROL AND COMMAND IN URBAN INFRASTRUCTURE MANAGEMENT

▷ Optional controls by city management e.g. commands to operators or use of actuators both in manual or automatic modes e.g. upon specific events, performance target thresholds or states of particular urban objects

▷ Customized indicators for the objects at each level of the urban area structure, its consolidation by the large number of urban objects, adaptation to changing requirements (city growth, additional parameters, accuracy, quality, standards)

▷ Easy and transparent definition of the city planning targets by each indicator for monitoring and benchmarking of sustainable development facilitating possible public visibility, discussions and acceptance

▷ Optional online public dashboards presenting city performance in real time, selected indicators and overall quality of life, objects, areas of public interest for transparency and citizen participation in various viewing modes such as interactive reports, graphs, tables, maps, benchmarks, widgets, events, subscriptions, etc

INTELLIGENT SUPPORT OF CITY INTERACTIONS WITH CITIZENS BY:

▷ Processing of citizens inquiries regarding urban issues, its forwarding to relevant service departments or service provider operators, monitoring of action results and providing personalized resolution feedback to the citizen-inquirers (roads, street lights, waste, service quality issues, etc)

▷ Evaluation of citizen satisfaction, relevant statistics and analytics of issues, its causes, efficiency of responses, use of city resources and budget

▷ City projects online by city administration with comprehensive visual, numeric and descriptive information, implementation stages (planned, ongoing, realized)

▷ City project ideas dashboard by citizen, project discussions by citizens, voting

▷ Relevant statistics and analytics of project related citizens activities

▷ Collaboration applications by third parties providing smart spaces solutions

▷ Publication of notifications of citizens about new city events, its distribution to the citizens subscribing for the specific events and projects

BUSINESSES AND PUBLIC DIGITAL SERVICES:

▷ Real time information about services by local businesses and public service providers

▷ Ongoing status, online vision of processes by dashboards, objects on city map, video and info details, direct integrations

▷ Provider options: from status "Now Open / Closed" to rich information streams enabling virtual presence, AVR, video, performance dashboards, events, announcements, online subscriptions and orders, benchmarks, etc.

▷ Service searched & Found by service categories, location, type, performance, quality, quality, tags, etc

Examples: public events, locations, sports, shows, sightseeing places and tours, museums, architectural buildings, restaurants, hotels, doctors, pharmacy, car repair, police, etc.

CIVIC SERVICES ONLINE:

▷ The information content: Regulated by service owners
▷ The information sources: automated (own systems) or manual by mobile apps
▷ The legal basis: Agreement "City – Service provider" for responsible, reliable quality content available in real time
▷ City role: Ensuring compliance to community, national and EU requirements for transparent public service quality
▷ Economic results for service provider: increased attractiveness, customer trust, visibility and sales revenue
▷ Economic results for the city: increased citizen satisfaction, community and investment image, attractiveness for tourists, visibility and revenue from service providers (new business model)
▷ Evidence statistics on urban services, its quality and usage based on open data

Note: The pilot city project enables free trial Smart Enterprise licenses to local business owners, universities, vocational training and consulting organizations

DIGITAL SERVICES OPTIONS FOR CITIZENS: **MY HOUSE**

▷ Available house services, its monthly/quarterly consumption (smart meters electricity, water cold/hot, waste, maintenance, cleaning costs, etc)

▷ Payment balance by each utility service (overpayment, debts, etc)

▷ Personal costs dashboard and analytics enabling vision of expenditures and services

▷ "Compare my quality of life to others" - city benchmarks with 2D/3D indicator maps of quality of life local vs. other resident locations and possibly cities (relative values by ratio "Cost/Resource consumption")

▷ Safety and security for the house (penetration control, notification, police notification, etc)

▷ Where are my kids now? Location services SMS, GPS, etc (schools, sports, vacations, etc)

The list may be extended based on project partner discussions and interests of communities

DIGITAL SERVICES OPTIONS FOR CITIZENS: **MY CITY**

▷ Mobile Searching & Finding of target services online in real time by status, quantitative and descriptive details of ongoing processes and events

▷ Sending inquiries / sharing information regarding urban issues, proposals and problem reports to the City administration (road pits, fallen tree, water leak, abandoned spaces, street lights, unregistered repair, accidents, fire, crime, waste collection, service quality, etc)

▷ Automatic receipt, registration, forwarding to relevant responsible service provider, setting service timeouts, receiving solution report, notification of the citizen-informant about the resolution, evaluation and statistics of service quality, customer satisfaction

▷ Sending responses, events and notifications to individual citizens by city administration including planned or actual life events (road works, transportation stoppages, electricity supply, city life discussion webinars, festive events on premises, exhibitions, meetings, elections, etc)

▷ Monitoring of public works: Checking particular city projects, maintenance and repair activities by the city administration (cross road streets X/Y, water pipe, cabling in location Z, bus route change, details of service representatives visits to houses on specific days, etc)

▷ Service feedback and proposals to city administration in standard online evaluation forms and voting widgets which allow its automatic processing, evaluation of results, adding to the city performance dashboards

DIGITAL SERVICES OPTIONS FOR CITIZENS: **MY CITY**

▷ Project ideas presentation by citizens, public discussions and voting realizing collective intelligence, involvement in policy making, planning, budgeting, smarter democratic decisions

▷ Community projects and city government online boards with comprehensive visual, numeric and descriptive information by implementation stages (planned, ongoing, realized)

▷ Optional crowd funding of collaboratively formulated and selected projects to make spending decisions that more accurately reflect the needs and wishes of citizens

▷ Common urban analytics: access to open data, civic service statistics, comparative benchmarks on service quality by difference residence areas, Dashboard "Our city quality of life" with different views by maps, graphs, benchmarks (energy efficiency, carbon footprint, waste, etc)

▷ Resource sharing support (cars, transportation vehicles, equipment, instruments, bikes, apartments, etc. by publishing the event with the reference to the location, brief description and conditions. In case of car pooling the owner may formulate the route, time of departure, have responses from those co-passengers who commute to the same direction and immediately send them confirmations.

▷ Standard citizen voting service on various issues related to local community life, its quality, various projects, ideas by the citizens and administrations, etc (requires identity by login)

DIGITAL SERVICES OPTIONS FOR TOURISTS: **CITY GUESTS**

▷ Mobile Searching & Finding target services online in real time by status, quantitative and descriptive details of ongoing processes, events

▷ Information about urban issues

▷ Personal assistant in sightseeing routing and festive events with AVR and

▷ Support in safety and security (status control, police notification, etc)

▷ Where to go? Location services for leisure, sightseeing, cultural places, sports, etc)

▷ Online visualization, learning, service ordering, personification

▷ Optional payment online for city services

▷ Personal information guide application supporting city life (routes, bus stops, history, buildings, architecture, hotels, restaurants, parking places, pharmacies, doctors, hospitals, car repair, etc.)

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Business Model components

▷ SAAS - Software platform as a subscription Service for Municipalities, Districts, Utility Service providers, Assets Management

▷ Licensing and technology transfer

▷ Project preparation and optional turn-key implementation

▷ Training of local Smart City Teams and city planners in municipalities

▷ Value added services to customers in Urban model building, testing, support

▷ Certification by ISO 37120

New Business Models for Metropolitan areas

City Authority and Community

▷ Own and run urban model enabling digital transformation into services
▷ Provide diverse public services to citizens and tourists
▷ Offer local providers opportunity to promote own business services
▷ Monitor service quality in the interests of community, tourists
▷ Open statistical data for transparency of urban life enabling image making
▷ Receive additional revenue from businesses signing the agreements

Businesses and public service providers

▷ Receive opportunity to offer and manage information about own services for citizens, tourists and other businesses in real time online
▷ Obtain improved business visibility and based on customer trust
▷ Explore new market channels and gradually improve quality of services
▷ Improve image and investment environment of the city

TECHNICAL DETAILS of the SMART CITY MONITOR PLATFORM:

▷ Web clients - app multi-server architecture, Docker enabled

▷ Open Source software components use in the system architecture incl. Linux, Apache, Postgresql, poco, qt5, C++, javascript, jquery, d3.js, node.js, html5

▷ Clients: MS Windows, Ubuntu (Suse, etc), Android, IOS (IPhone/IPad)

▷ Open agile, scalable client-server architecture

▷ Computing environment: in cloud or at-premises servers

▷ Reporting dashboards: js/html/css web pages viewing and interaction

▷ Central portal: Self management of services and own servers by subscribers, automatic server and client version updates, protection, e-learning, collaboration

▷ Connectivity: Internet, local cable and Wi-Fi networks, cellular

▷ Security: https, websockets, SSL keys 2048 (or more), AES 256

▷ Scalability vertical (performing hardware) and horizontal (adding hardware)

5.
Collaboration offers for

Forward looking metropolitan communities
Utility service providers
Financial institutions enabling urban and industrial innovations,
sustainable development and circular economy
Citizens' Living Labs interacting with novel city services
Organizations promoting tourism and investments

THE OFFER for INTERNATIONAL RDI PROJECTS and PARTNERS:

▷ Licensing and technology transfer

▷ Prototyping Smart Metropolitan Futures

▷ Enabling local urban communities with new generation of urban technology and Learning

▷ Setting project consortiums funded by available financial instruments e.g. EBRD, EIB, Horizon 2020, WB, etc

CONCLUSION:

Smart City Monitor ICT innovation empowers urban communities for their sustainable inclusive development into the green future. Its anticipated application results:

▷ Creating new vision, knowledge, mind set by prototyping and learning
▷ Experiments under reasonable costs and minimum risks in small scale and steps
▷ Innovative leadership in practical implementation of the novel digital services for local metropolitan communities of different sizes and budgets
▷ Tremendous growth of public attention to innovative city developments in the country and internationally, attractiveness for young citizens
▷ Promoting smart skilled manpower and green technologies, new jobs for university graduates and job market options, new employment opportunities
▷ Quick increase of community attractiveness for investors and economic growth
▷ Innovative opportunities attract tourists and enable new local business services
▷ Costs, risks and ROI for community budgets more transparent and predictable

Inform us about your Smart Sustainable Green Community and Circular Economy Projects

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