Smart City Monitor

Novel digital transformation technology for smart governance and enhancement of urban life

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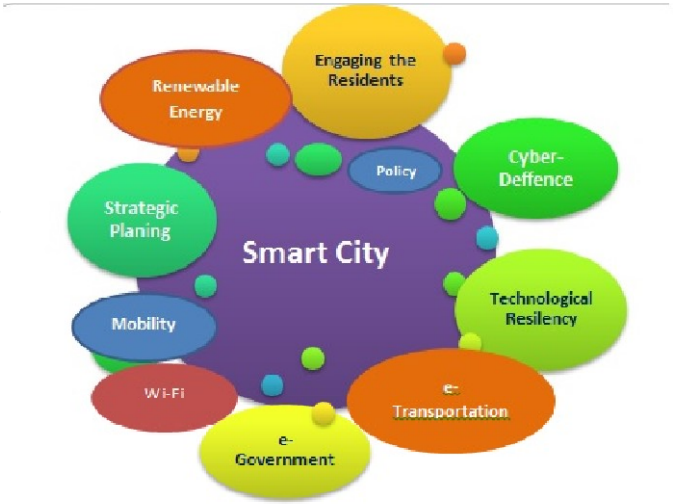
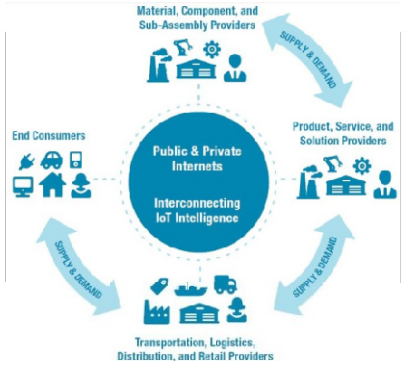
smart city expo WORLD CONGRESS

ADVANTAGE AUSTRIA WKO

Challenges of our time

- **Accelerating Change:** in technologies, knowledge, demand, supply, requirements, quality, environment, standards, climate, markets, social life, etc
- **Growing Complexity** of Everything
- **Smart Everything** appears Everywhere
- **Inter-linkage of Smart Systems** augments to the Complexity
- Complexity increases the **Uncertainty**
- Altogether these affect **Sustainability**





SMART GOVERNANCE, MANAGEMENT and NOVEL URBAN SERVICES ENHANCING STAKEHOLDER'S LIFE

Smart City Monitor enables holistic vision of complex interlinked urban processes by making and running its smart model in cloud for

UNDERLYING CONCEPTS:

- Enabling digital transformation of complexity into simplicity and transparency of ongoing urban and industrial processes
- Creating Open Model of complex cyber-physical system with interlinked smart objects (urban area, industrial enterprise)
- Providing interactive instruments for easy advancing of the very complex real world models, it‘s adapting to change
- Simple maintenance and upgrading of large models
- Easy linking to necessary data streams from real world processes - smart systems, IoT, sensors, SCADAs, ERPs, MES, databases, etc

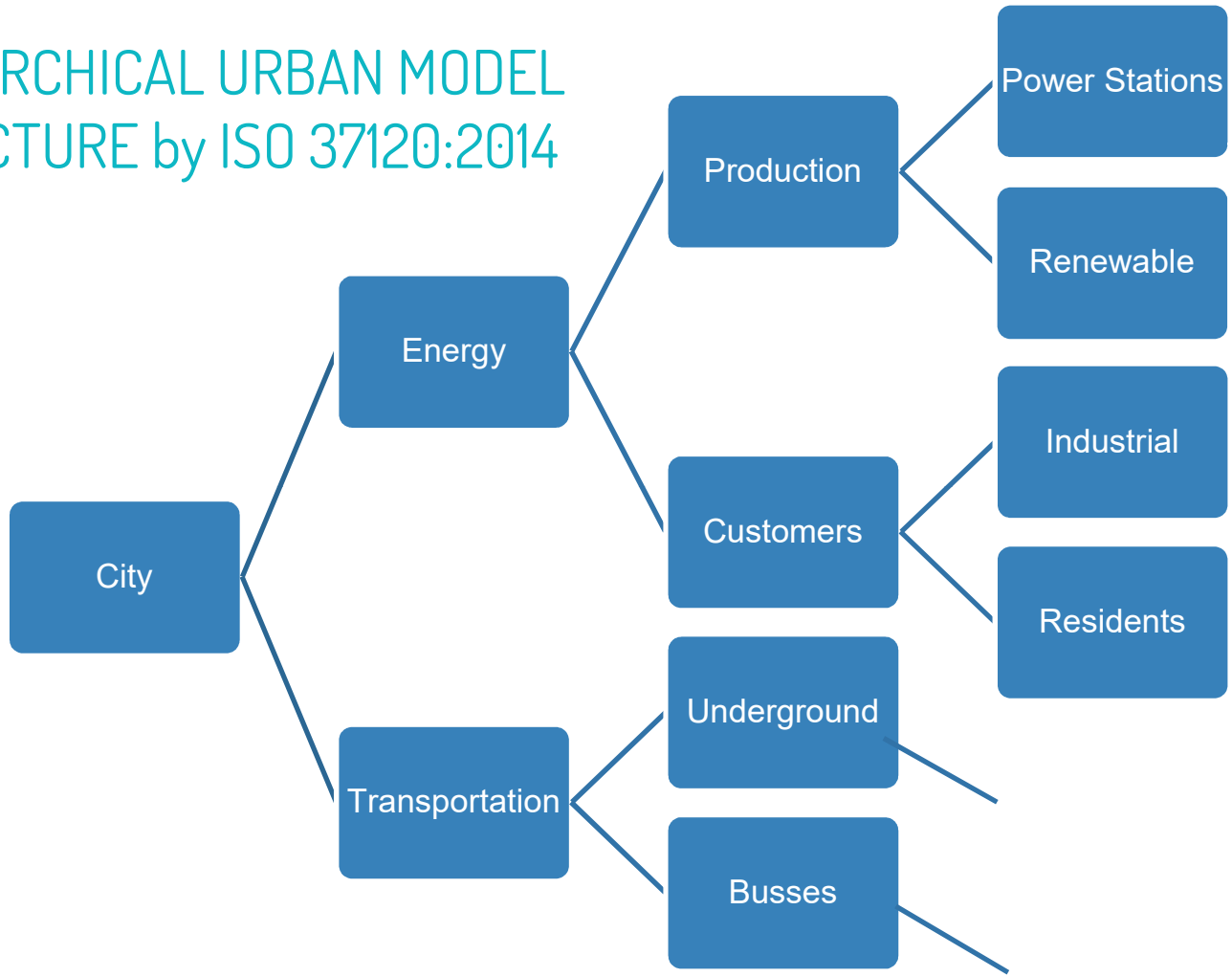
THE OBJECTIVES:

- Quick and easy implementation of specific model for each unique urban area and and its further advancement
- Prototyping of smart innovative solutions by modeling and improving with minimum costs & risks
- Providing simple integrated vision of processes in real time
- Smart interactions “Employees – Managers“ and “Citizen-Governance” realizing improvement, experimenting
- Transparency for sustainability enabled rich information services for monitoring, controls, preemptive analytics, etc
- Experimenting with new business and investment models

THE CITY AS COMPLEX CYBER-PHYSICAL SYSTEM

THE MODEL EXAMPLE

HIERARCHICAL URBAN MODEL STRUCTURE by ISO 37120:2014



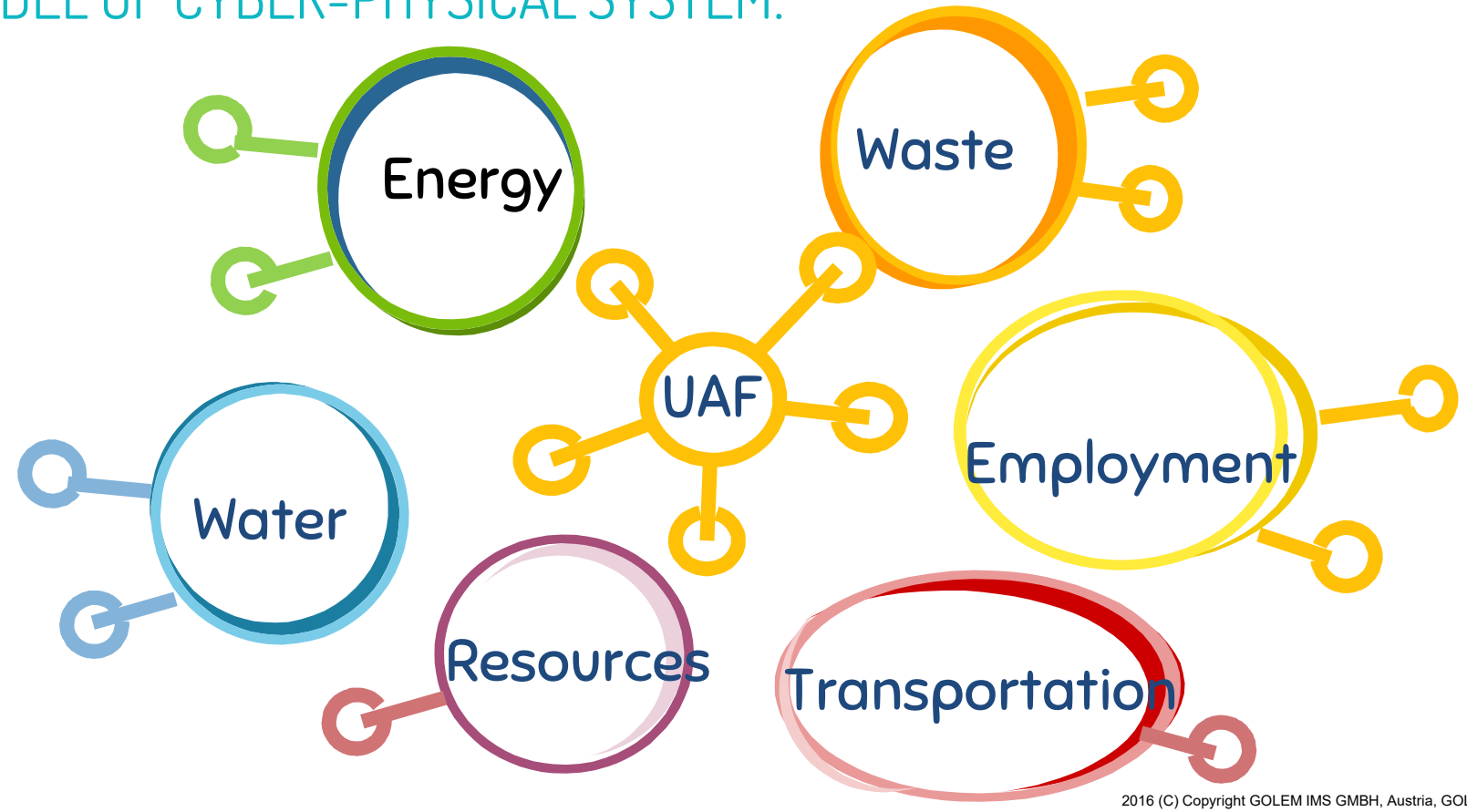
Starting the Urban Model by ISO 37120 Themes of City Services and Indicators of Quality of Life and its further enhancement by local requirements and new standards e.g. 37150, 37151, etc and

Themes of City Services and Quality of Life by ISO 37120

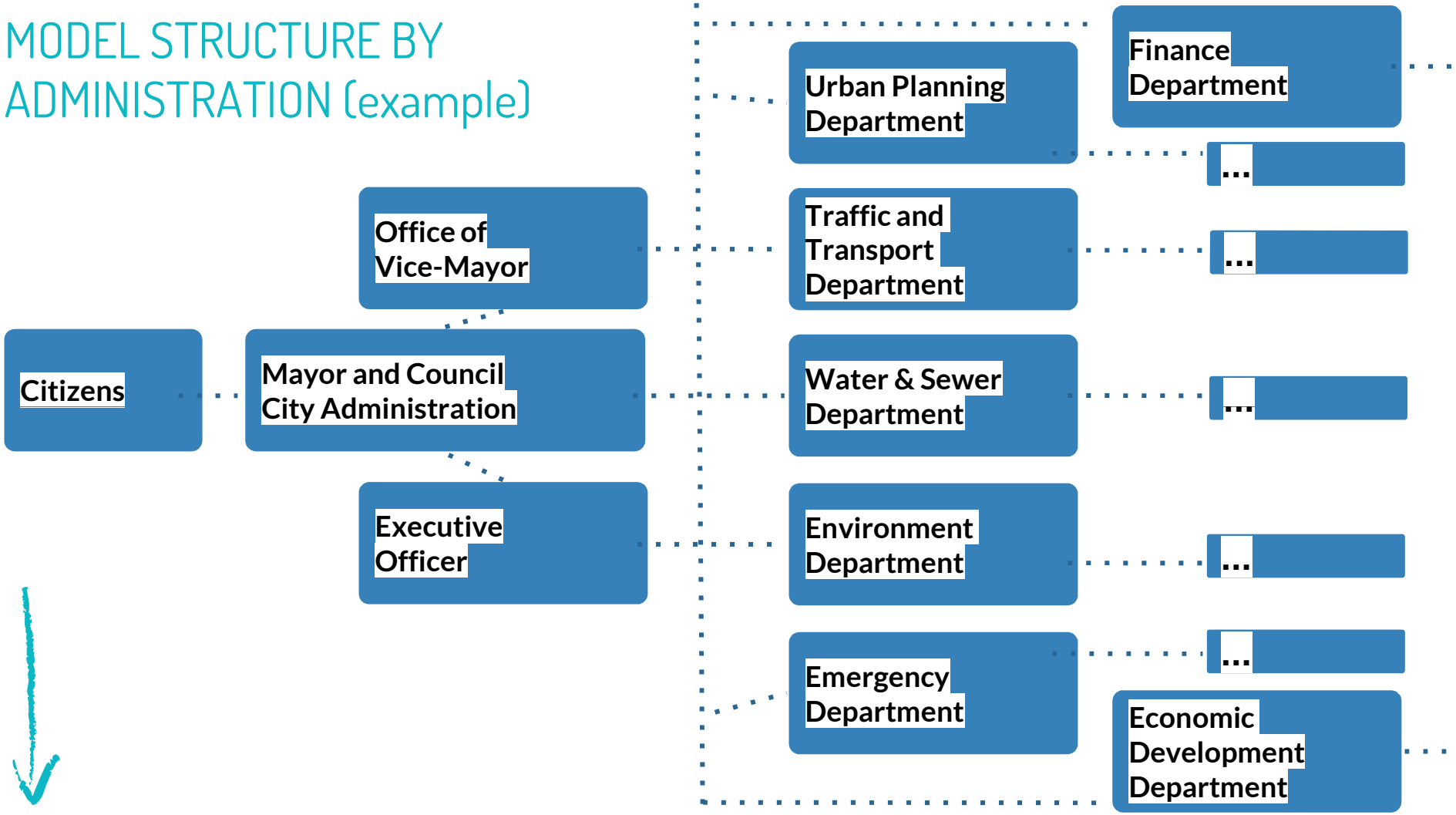
Economy
Education
Energy
Environment
Finance
Fire and Emergency Response
Governance
Health
Recreation
Safety
Shelter
Solid Waste
Telecommunications and Innovation
Urban Planning
Transportation
Wastewater
Water and Sanitation

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

MODEL OF CYBER-PHYSICAL SYSTEM:



MODEL STRUCTURE BY ADMINISTRATION (example)



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

STANDARD PROPERTIES of THE NODES:

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
Cameras
Energy sources
Reports providing views to processes
Rules of state calculation depending on states of its Indicators and sub-objects

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

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

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

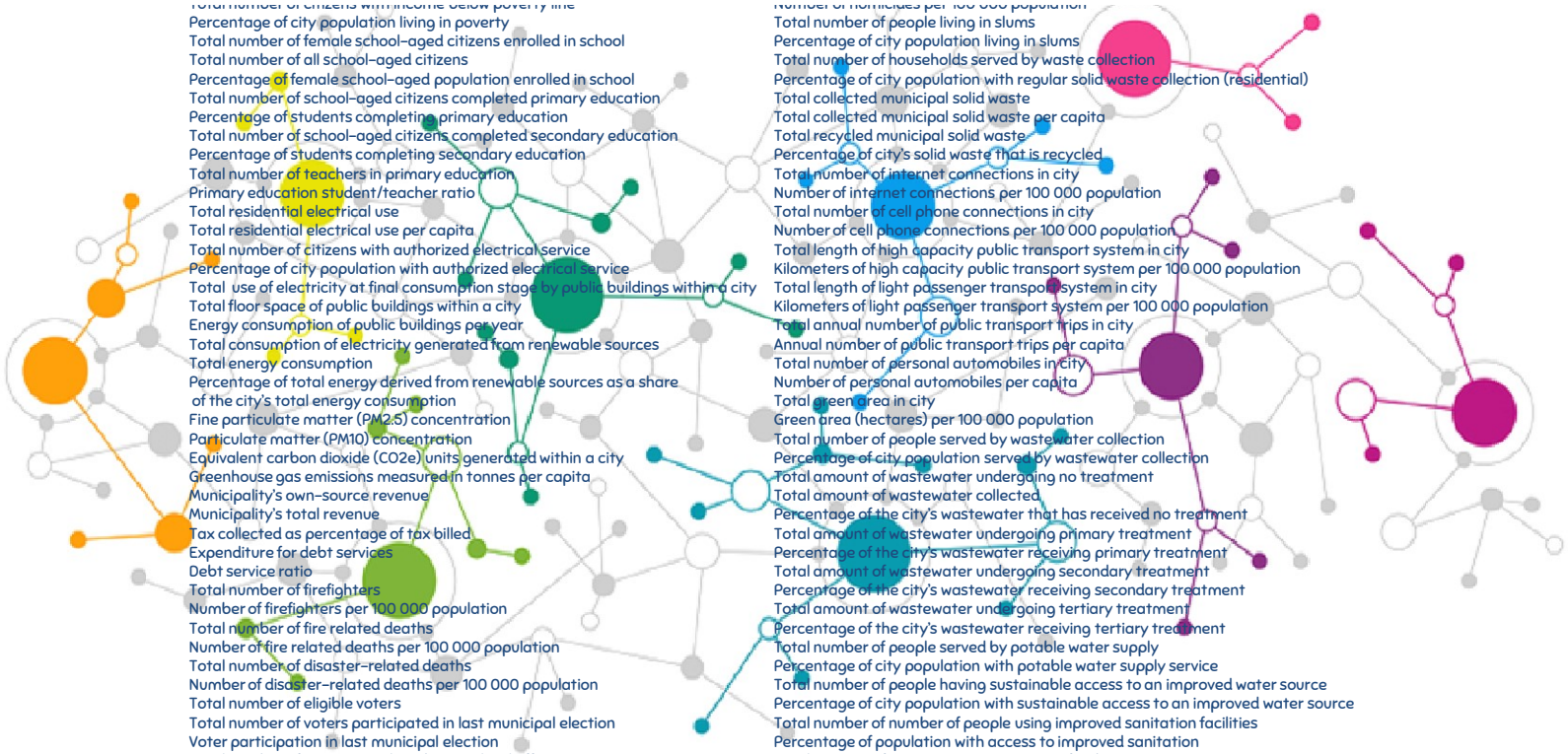
of the city's total energy consumption
Fine particulate matter (PM2.5) concentration
Particulate matter (PM10) concentration
Equivalent carbon dioxide (CO2e) units generated within a city
Greenhouse gas emissions measured in tonnes per capita
Municipality's own-source revenue
Municipality's total revenue
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

Total green area in city
Green area (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

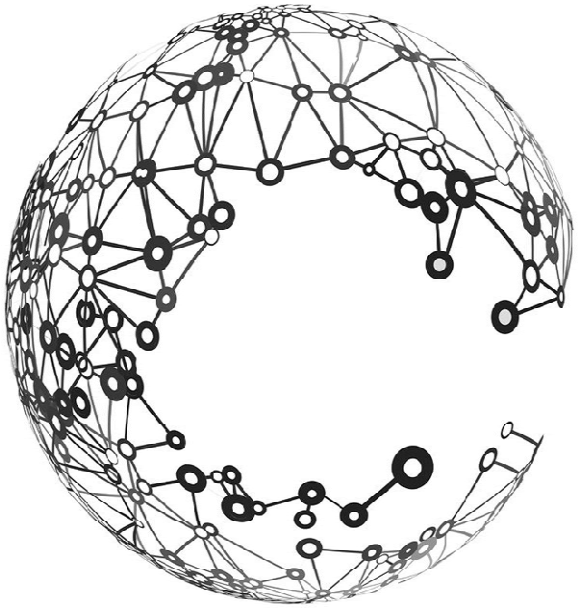
EACH DOT REPRESENTS PARTICULAR OBJECT INDICATOR

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

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



THE COMBINATION OF SUCH INDICATORS VALUES IS ANALYZED IN REAL TIME



The NODES are defined and act as SMART OBJECTS

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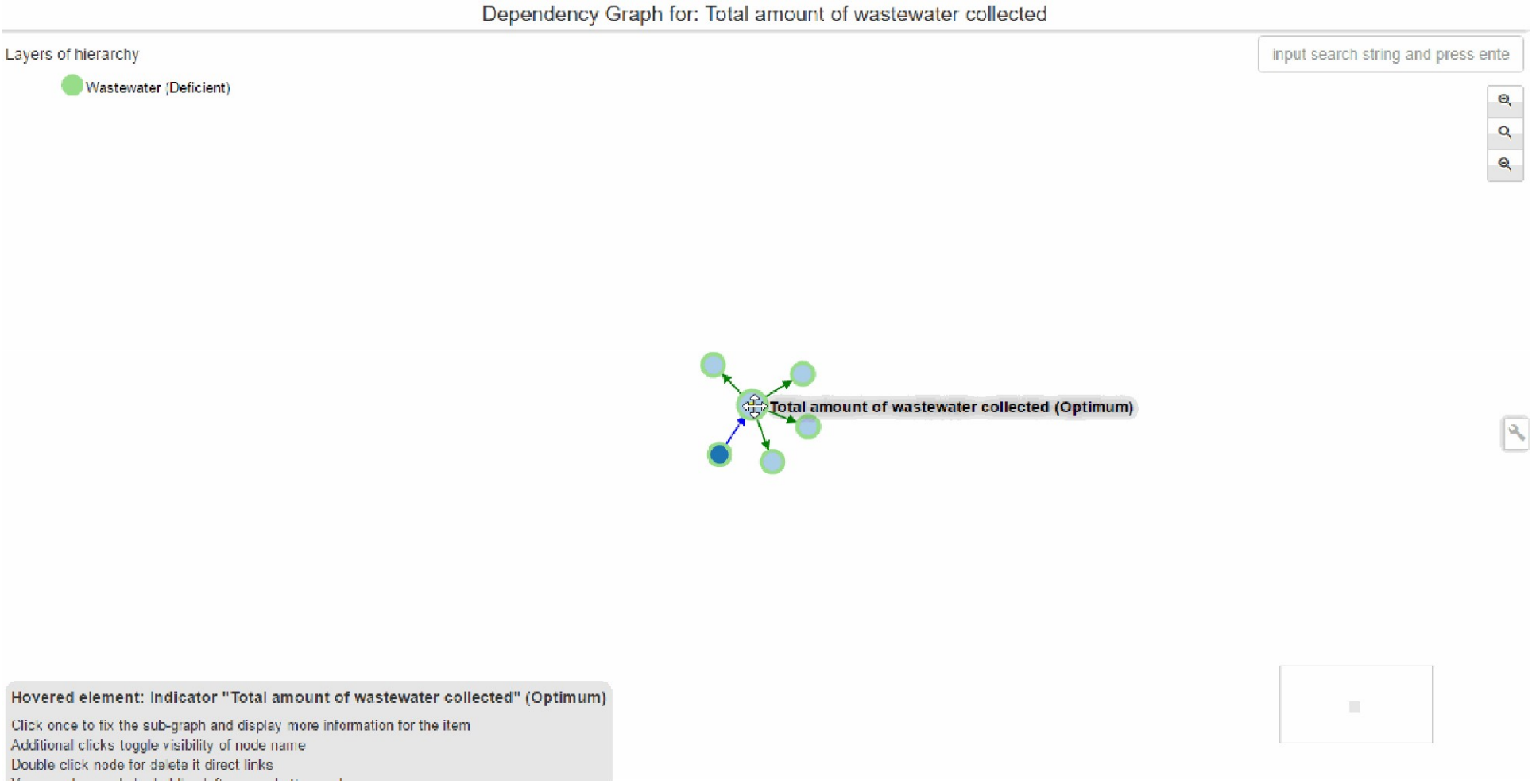
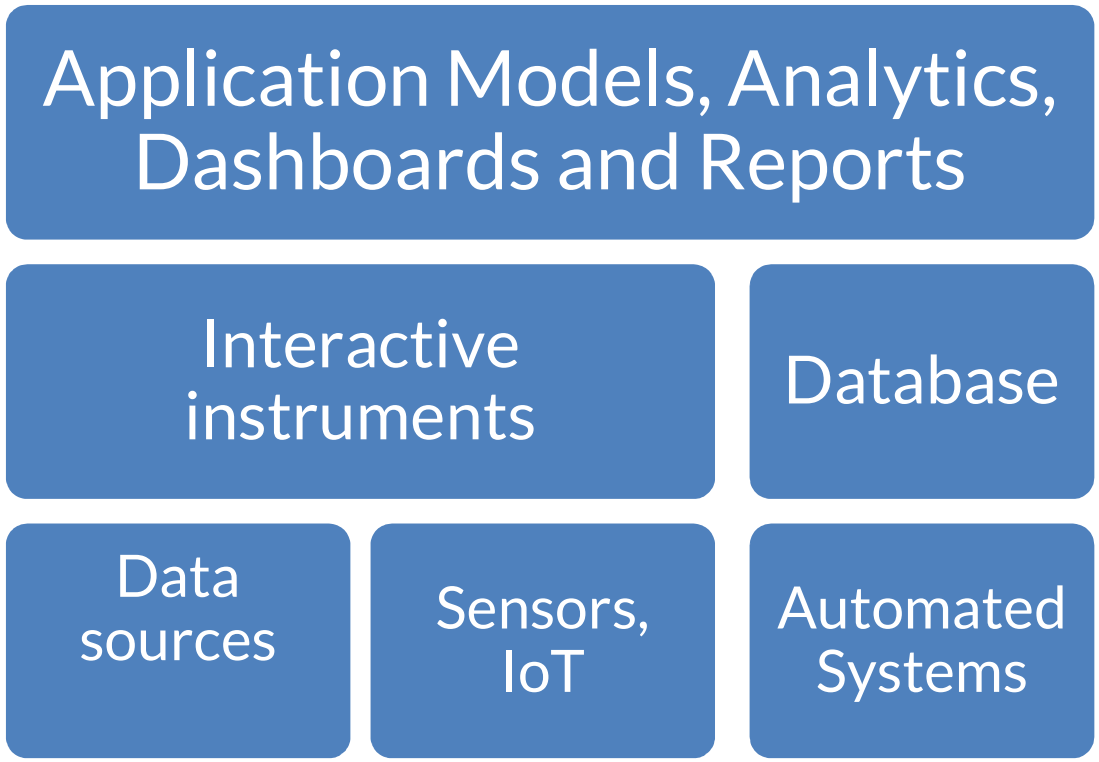


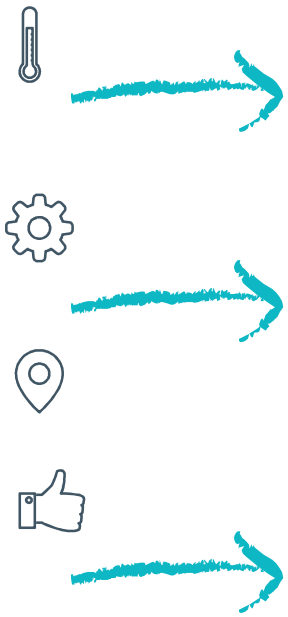
Smart City Monitor at a glance



TECHNICAL DETAILS of the SMART CITY MONITOR PLATFORM:

- It has only Open Source software components under Linux OS
- Apache, node.js, Postgresql, poco, qt5, C++, javascript, jquery, d3.js, html5
- Clients: MS Windows, Ubuntu etc), Android, IOS (IPhone/IPad)
- Open agile, scalable client-server architecture, docker enabled
- 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 Pharos servers by subscribers, automatic server and client version updates, e-learning
- 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)
- Powerful yet simple in use instruments for customized model building

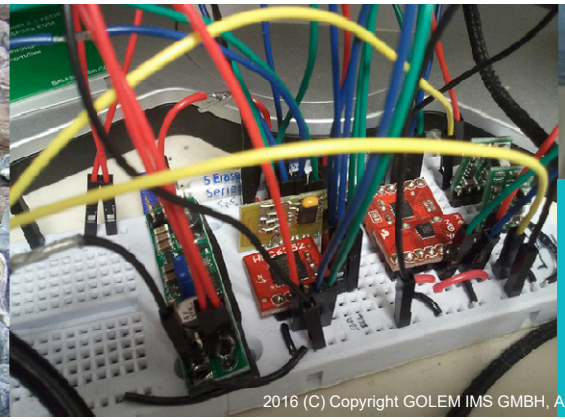
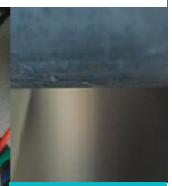
DATA SOURCES:



Databases
Sensors
Internet of Things
Automated control systems
SCADAs, ERP, MES, etc
Web sites
Social networks
Anything generating data streams
Smart Connected Assets



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 user diverse roles: citizen, tourist, business service provider, urban service specialist, community manager (i.e. all stakeholders)
- Easily personalized to support high quality of life and operations (procedures, instructions, statistics and analytics, quality measurements, predictive options, etc)
- Correspond to planned operational procedures

In a Smart Urban Area as Complex Cyber-Physical System its big data streams shall be transformed into:

Simple, easy understandable human terms and images supporting high quality life activities, and positive perceptions:

How are you, my City?

WHAT IS THE CURRENT STATUS OF OUR CITY?

OR

SUBSYSTEMS in ENERGY, WATER, WASTE TRANSPORT, etc ...


A new style of city management:
SMART CITY MONITOR
smartcity.win2biz.com
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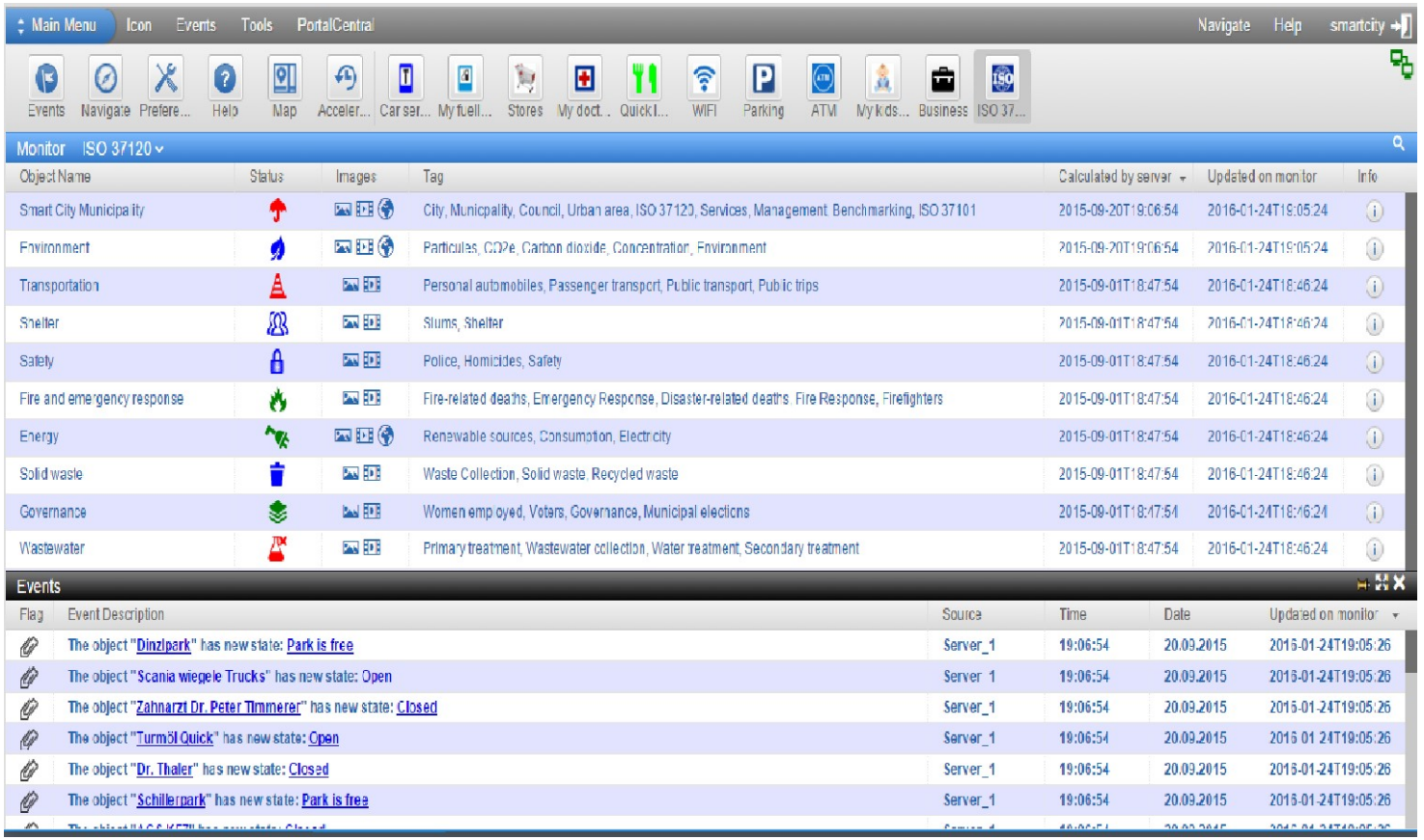
SMART CITY MONITOR:

REAL TIME SERVICES TO URBAN COMMUNITY STAKEHOLDERS



The user views the City accordingly to his/her needs. The information is available on dashboards, reports, alarms, maps, SMS, mobile devices

DEMO in VIDEO or INTERACTIVE MODES:

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

- Running Smart City Monitor
- Making the model structure and indicators
- Analyzing the dependencies
- Adding sensors or video cameras to Smart Objects
- etc

ENABLING DIGITAL SERVICES FOR

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

REAL TIME SERVICES TO CIVIC STAKEHOLDERS:

- Smart 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 actions based on evidence data and controls
- Enabling diverse mobile applications based on evidence data

New Business Models for Municipalities

City Authority and Community

- Owns and runs urban model enabling digital transformation into services
- Provides diverse public services to citizens and tourists
- Offers local providers opportunity to promote own business services
- Monitors service quality in the interests of community, tourists
- Opens statistical data for transparency of urban life enabling image making
- Receives 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

Collaboration offers for

Forward looking urban communities
Service providers for urban areas
Financial institutions enabling innovations
City services interacting with citizens
Tourist organizations

LET'S START PROTOTYPING NEW URBAN FUTURE by

- Risk free projects implemented in small steps
- Run under cost effective budgets
- Enabling local urban communities with new generation of urban technology
- Learning by experimenting with applications, it's integration with local providers
- Using available financial instruments (ESIF, EBRD, EIB, Horizon 2020, etc)

CONCLUSION:

The new advanced urban technology Smart City Monitor provides unique opportunity for pioneering experimental projects bringing the city and citizens into the future. It requires changing minds, experimenting, learning while under reasonable costs.

CONCLUSION: the anticipated results:

- New knowledge and capacity to implement forward looking advanced projects
- Innovative leadership in EU in practical implementation of the novel digital services for local urban community
- Growth of innovative city image, interests of young citizens and employees
- Quick increase of attractiveness for investors and economic developments
- New jobs for university graduates and job market options
- Grows of tourists attractiveness by innovative opportunities and local support
- Transparency of urban processes and operational management
- Predictability of costs, risks and ROI for the community budgets

View demo online: http://win2biz.com

Contacts for business collaboration: info@golem.at

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