SMART CITY CONCEPTS AND ENERGY EFFICIENCY IN HUNGARIAN CITIES

Mihály Lados
senior research fellow
CERS HAS, WHRD IRS - Győr

3rd Plenary Meeting Concerted Action for the Energy Efficiency Directive

INFO 3.5 Session on
‚Smart Cities and Smart Consumers'

Intercontinental Hotel, Bucharest, Romania
October 17-18, 2018

Content

1. **Smart City Model**
2. **What Cities Can Do?**
3. **Smart City Models in Hungary**

Smart City Model

What is smart city?

a mayor

a city planner

A CITY

an university

a public service/utility company

I am

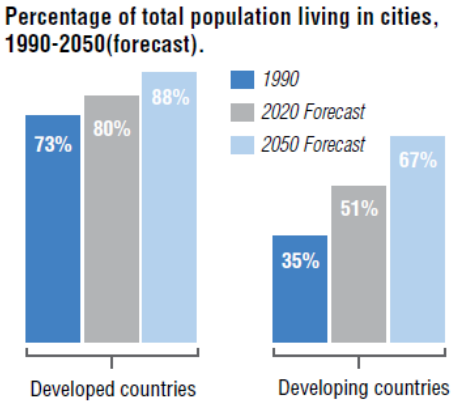
an IT company

a government office

a civic/non-profit organisation

A CITIZEN

Challenges



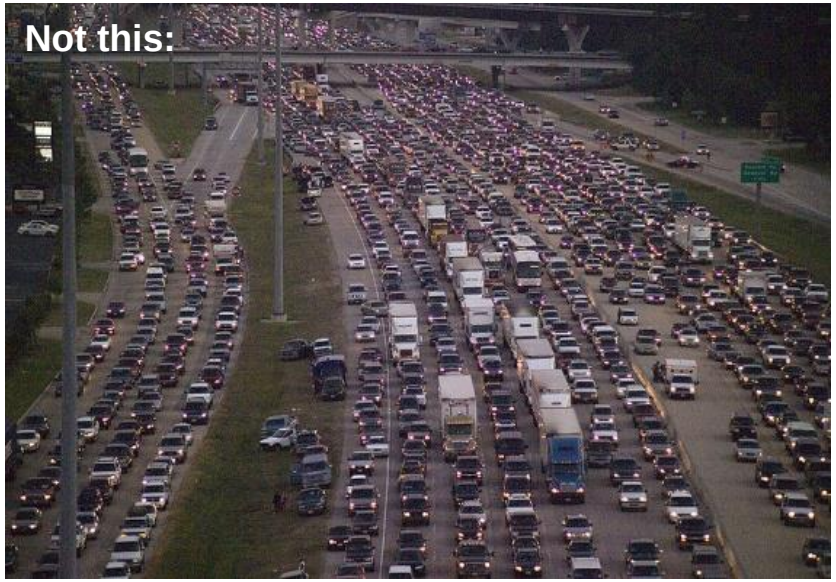
growing urban population

→ **increasing CO_2 emission**

→ **climate change**

→ **increasing migration flow**

→ **growing urban population**



Edited: Horváthné Barsi, B. and Lados, M.

EU Objectives to Adapt Climate Change

Objectives	for 2020	for 2030
Reduction of CO_2 emission	20%	40%
Increase the share of renewable energies	20%	27% (32%)
Increase the energy efficiency	20%	27% (32,5%)

Covenant of mayors

The EU Covenant of Mayors for Climate & Energy brings together thousands of local governments voluntarily committed to implementing EU climate and energy objectives.

- *since 2008*
- *7,755 signatories (members)*
- *57 countries*
- *252,629,868 inhabitants*

Until 2015:
SEAP
adopting EU 2020 objectives

Since 2015:
SECAP
adopting EU 2030 objectives

Objective - Signatories' commitments

Signatory cities pledge action to support implementation of the EU 40% greenhouse gas-reduction target by 2030 and the adoption of a joint approach to tackling mitigation and adaptation to climate change.

See more at *https://www.covenantofmayors.eu/*

CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Global strategies – Smart world models

IBM: Smarter Planet

- instrumentation (digitalization)
- interconnected
- intelligence

for an efficient, sustainable, and intelligent city

http://www.ibm.com/smarterplanet/us/en/

Cisco: Smart + Connected Communities

- intelligent urbanization in 5 areas:
  - mobility,
  - energy and public utilities,
  - real estate,
  - security,
  - public services (education, governance, public health, sports and entertainments),

for a network based sustainable community

http://www.cisco.com/web/strategy/docs/scc/09CS2326_SCC_BrochureForWest_r3_112409.pdf

Smart City Definition by the ITU-T

"A smart sustainable city (SSC) is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects".

https://www.itu.int/en/ITU-T/focusgroups/ssc/Documents/Approved-Deliverables/TR-Definitions.docx

'Intelligent' vs 'Green' vs 'Smart' cities

Intelligent city

- Applications of ICT in the communication between city management and local residence
  - ensure to give and get information
  - e-administration

Green city

- sustainable, liveable environment
  - energy efficiency, renewable energy
  - green areas

Smart city

- ICT as city management tool
  STRATEGY, SUSTAINABILITY, COST-EFFECTIVENESS, RELIABILITY, TRANSPARENCY, COOPERATION/INVOLVEMENT

SMART CITY = LIVEABLE CITY

What Cities Can Do?

Smart City – Demand and Supply

Demand side: *Smart city research & planning*

- *measuring smartness:* ranking, benchmarking
- *planning:* strategies, roadmaps, action plans

Supply side: *Technological solutions*

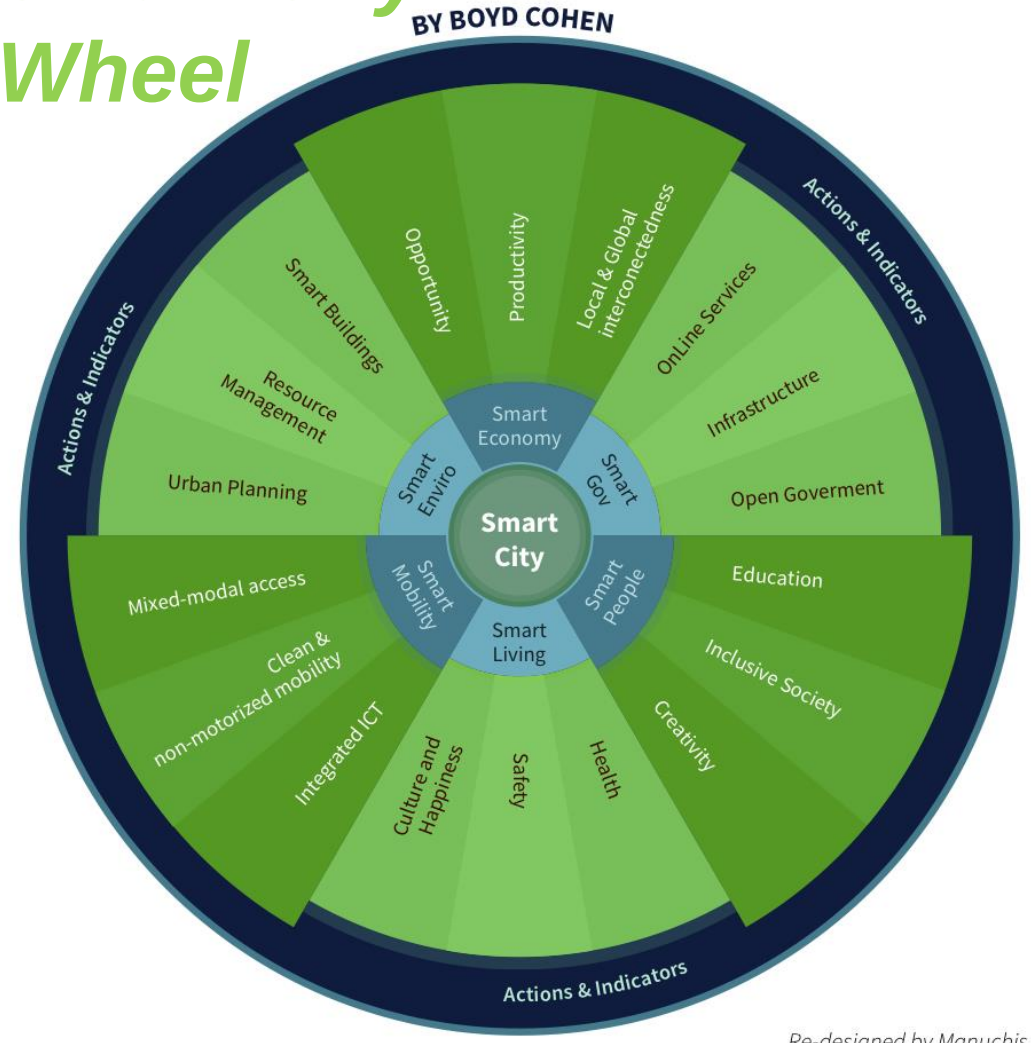
- *market players:* development of services and applications
  (eg. IBM: http://www.ibm.com/smarterplanet/hu/hu/smarter_cities/overview/)
- *non-market players:* platforms and networking
  – collecting good practices and knowledge transfer
  (eg. Sustaina 100 – since 2012: http://www.sustainia.me/solutions/;
  Smart Cities and Communities: http://eu-smartcities.eu/;
  Smart City Council: http://smartcitiescouncil.com)

Measuring Smartness of the Cities – Sustainability and Smart City

European Smart Cities	Smart City Index	Smarter City Assessment	Smart City Index Italy	Sustaina 100	Sustainable Development Goals
TU Wien	Boyd Cohen	IBM Belgium	Between	Sustaina	UN
6	**6**	**7**	**13**	**11**	**17**
Smart Economy	**Economy**	**Smart Businesses**			**Sustainable economic growth**
Smart Mobility	**Mobility**	**Smart Transport**	**Smart Mobility**	**Transport**	**Build resilient infrastructure**
Smart Environment	**Environment**	**Smart Energy**	**Energy Efficiency**	**Energy**	**Sustainable and modern energy**
Smart People	**People**	**Smart People**	**Smart Health**	**Health**	**Healthy life and well-being**
Smart Living	**Living**	**Smart Communication**	**Broadband**	**IT**	**Global partenrship**
Smart Governance	**Government**	**Smart City Services**	**Smart Government**	**Cities**	**Sustainable and inclusive cities**
		Smart Water	**Smart Education**	**Education**	**Education**
			Alternative Mobility	Trends	End Poverty
			Renewable Energy	Buildings	Achieve gender equality
			Natural Resources	Resouces	Reduce inequalitis within and among countries
			Smart Culture & Travel	Fashion	Gender
			Smart Urban Security	Food	Food safety
			Smart Justice		Smart consumption and production
					Climate change actions
					Conservation sust. use of oceans
					Protect ecosystem
					Promote inclusive societies

Edited: Lados, M.

Smart City Wheel



Re-designed by Manuchis.

Source: Cohen (2014)

Evolution of Smart Cities

1.0 – Technology driven:
IT companies develop smart solutions

2.0 – City driven:
technology enablers to improve of quality of life

3.0 – Community driven:
citizen co-creation

Source: Cohen (2015)

Smart City attitudes of large Austrian cities 1

City	Identification	Main areas	Documents
Smart City Graz	as a high tech, **energy efficient**, resource saving and low emission city with a high quality of living.	Economy, Society, **Mobility**, **Energy supply/disposal, Buildings,** Ecology	"I live Graz" Vision 2020; 2030 and Vision 2050
Smart City Linz	as an 'intelligent city' that strives for intelligent and innovative solutions on how to deal with resources in a sustainable manner.	**Housing, Energy supply and distribution, Mobili**ty, Information technology	**Holistic energy vision for 2050**, Roadmap for 2020, Action plan 2012-2015
Smart City Salzburg	as a city worth living in, which is connected in an intelligent way and based **on renewable resources, sustainable mobility** and participation.	**District heating systems**, City planning / development, **Energy, ICT, Mobility**	Master plan Smart City Salzburg 2025, Vision Smart City Salzburg 2050, **Strategic energy plans**
Active Innsbruck	as a research and education center for **energy innovation and climate change adaptation** in the Alpine region.	**Energy, Buildings, Mobility, Supply networks**	**Innsbruck Energy Development Plan (IEP)**, Energy Vision 2050, Action Plan 2012 -2025
Smart City Klagenfurt	**intends to reduce 50% of greenhouse gas emissions in several selected areas of Klagenfurt by 2020 and by 2050 90% of emissions in the entire city**.	**Energy efficiency, intelligent mobilit**y, density/compactness ecological urban development **new forms of housing/working**	The 'smart city' strategy is embedded into the urban development concept.

Source: Sedlacek, Peer and Mulholland (2015)

Smart City attitudes of large Austrian cities 2

City	Is Smart City strategy integrated into the city development plan?	Cooperative governance	Smart city agency?
Smart City Graz	**Yes** Understood as sustainable urban development	**Partially** Installment of a smart-citizen platform. Workshops, seminars, events. 1 Smart City Graz Forum	**No** Coordinated by the city of Graz
Smart City Linz	**Yes** But it is not part of the sustainability strategy. It is defined as an independent project under the title "intelligent energy management"	**No** Stakeholder participation without residents	**No** It is administered by Linz AG. Agency is planned.
Smart City Salzburg	**No** Falls under the energy policy domain which is one pillar in the city planning. Currently it seems to be an independent activity but it is planned to implement a cross-cutting administrative structure	**No** Project team: City of Salzburg, Salzburg AG, AIT, SIR. Only three single day workshops with a bigger stakeholder group.	**No** Coordinated by one person in the city administration.
Active Innsbruck	**No** Defined as a project „Active Innsbruck"	**Partially** At a stakeholder forum the city agreed to work out a long-term qualitative energy vision with experts and residents	**No**
Smart City Klagenfurt	**Yes** Vision is part of the urban development concept (STEK)	**No** More participatory/collaborative planning methods and instruments are planned	**No**

Source: Sedlacek, Peer and Mulholland (2015)

Smart City Wien – The City for Life

TOP 10 of Smart Cities by Boyd Cohen (US climate strategist)

- 2011: **The Top 10 Smart Cities On The Planet – No 1 is Vienna**
- 2012: **The Top 10 Smartest European Cities – No 4 is Vienna**

Key elements for Smart Vienna:

- *Policy and vision:*
  „Smart City Wien" initiative set by the mayor of Vienna in March 2011
- *Planning:*
  Smart Energy Vision 2050, Roadmap 2020, Action Plan 2012-2015, Smart City Wien Framework strategy (2014), STEP 2025
- *Smart City management:* TINA Vienna (1997) → ***Smart City Wien AG*** (2012)
- *Involvement of all citizens*
- Using the *latest technologies* in compliance with ecological standards
- *Key projects*, eg.*:* citizen's solar power plant, car-free living, Bike City, aspern Vienna's Urban Lake Side, Marxbox: „Green" Laboratory Building
- *Internationalisation:* e.g. Smarter Together (H2020), INWAPO (Central)

Source: based on https://smartcity.wien.at/site/en edited Lados, M.

Smart City Approach and Energy Efficiency in Hungary

Attitudes of Hungarian Cities

Cities

1. with Smart City Strategy (e.g. Veszprém, Miskolc, Debrecen)
2. with Smart City Vision and development of smart solutions without Smart City Strategy (e.g. Győr)
3. with supply driven smart applications without Smart City Strategy (e.g. Szolnok – T-City)
4. with development of smart solutions and active local society in smart city applications without Smart City Strategy (e.g. Budapest)
5. with development of smart solutions of local services companies in cooperation with local governments (e.g. Sopron)
6. no relation to smart city model (e.g. Dunaújváros)

Miskolc – Planning basis

Urban Development Concept (TK)

Integrated Urban Development Strategy (ITS)

Modern Cities Program

Smart City Program

Mapping financial resources: *ITP/TOP, OPs, H2020*

Source: based on Kiss, G. (2015)

„Smart City – Smart Miskolc" program

Preparation of feasibility study for smart city strategy and program:

- *general „Smart city" concept,*
- *development of „smart" self-audit,*
- *collecting national and international good practices,*
- *programme communication and financial mapping,*
- *pre feasibility studies for 13 smart city actions.*

„Establishment of an integrated information system as horizontal requirement related to each smart city development."

Source: based on Kiss, G. (2015)

„Smart City – Smart Miskolc" actions

1. Survayor system
2. Digital payment in local public transport
3. Digital payment applications in other local public services
4. Urban Management Information System (VIR)
5. **Intelligent traffic management system**
6. **E-bike program**
7. Further mobil app development of local tourism info system
8. GIS system in the management of local public utilities
9. **SMART GRID development for municipal buildings and individual electricity consumer with solar energy**
10. **Installment of city level integrated energy management and monitoring (implement of Smart Metering)**
11. City Service Application (TIMI)
12. Data storage and management of local public health services
13. Development of digital community – set up real and virtual spaces

Source: based on Kiss, G. (2015)

Smart City approach of Debrecen

Smart Citizens – *prepared for challanges of the 21th century*

Smart Urban Management

Smart Technology and Infrastructure

Source: based on Váróczy, Z. (2016)

Smart City activities in Debrecen

1. **Digital knowledge of local citizens**
2. **Efficient urban services**
3. **Smart Energy**
4. **Public safety**
5. **Urban transport**
6. **Sport**
7. **Local health services**

Management Framework:

- **Smart City Management (within EDC)**
- **Smart City Webside**
- **Smart City Dialogue**

Source: based on Váróczy, Z. (2016)

From intelligent Győr towards smart Győr

2001: *Strategic and operative programme of intelligent Győr* – one of the first city information society strategy in Hungary.

2003-2004: *Strategic Program of Győr* – application of community planning: **Future dialogues**.

2004: *Application for European Capital of Culture 2010* – culture and innovation

2006: *Growth Pole Programme of Győr (Autopolis)* – cooperation of city-university-economy: **Triple helix model in practice**

2008: *Integrated Development Plan of Győr* – one of the measure: implementation of the former Intelligent Győr programme

2011: *intelligent buses and passenger information system*

2013: *Smart City Győr* – contract with E.ON Hungary
(pilots on smart grid and metering, energy efficiency)

2014: *Integrated City Development Strategy of Győr 2014-2020 + EYOF 2017:* smart city approach in energy efficiency related to urban management + Smart City study (PWC)

since 2015: *Dialogue about smart city issues* organised by Hungarian Society for Urban Planning

2017: *Modern Cities Program – 18 initiatives contracted with Central Government*

There are Smart City initiatives, but there is no an integrated Smart City Strategy of the city!

Egészség
Kultúra
Innováció
A jövő Győrben épül.

Smart City Győr – definition and vision

DEFINITION BY GYŐR:

Győr as „smart city" is able to be **more sustainable and liveable** and improve the quality of life of local citizens by the **cooperation with local stakeholders**, involvement of people and **advanced technological and ICT solutions.**

In this process the city makes its **operation more efficient**, **increases the performance of local economy and touristic attractiveness**, and develop and improve the capacity of **urban service**s.

VISION:

By **2020** Győr has a **leading position** among Hungarian cities in the spread knowledge and ICT based local services and **becomes one of the most „intelligent" („smart") Hungarian city**.

Source: Fekete, D. (2015)

Smart City initiatives in Győr

- ***Intelligent mobility***
- intelligent local public transport
- smart traffic management (smart traffic lights)
- mobile parking
- management of P+R parking places
- Győrbyke

Egészség
Kultúra
Innováció
A jövő Győrben épül.

- ***Smart public lighting:*** „smarting" 150 lights (lighting control, metering)

- *Energy management*
- energy efficiency program of block houses
- smart solar cells (in two public institutes: renewable energy+ metering)
- complex building energy management system development (Aqua Sport Centre)
- urban electric charging stations

- ***City service application:*** cooperation of Győr MJV, E-ON, Vill-Kor Hungária, GYÖR-SZOL, Pannon-Víz, Győr MJV Útkezelő Szervezete

- ***City index audit system*** (220 indicators)

Source: Based on Fekete, D. (2015) edited Lados, M.

Experiences of Győr

STRENGTHS

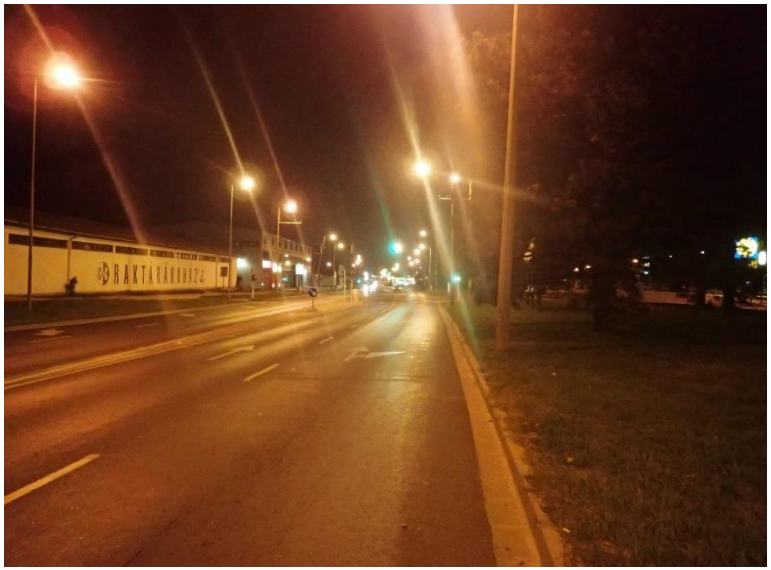
- political commitment
- integrated system
- intelligent public follow up of indicated problems of public utilities
- cooperation of local government and local public services companies

WEAKNESSES/TREATHS

- rather supply than strategy driven development
- weak publicity of existing smart services
- missing involvement of community
- centralisation trend of local public utilities at the national level

Results of public lighting developments in Sopron

In the pilot district of the city the total yearly energy consumption of 2,432 pieces of fixtures was 742.586 kWh. After the development this amount decreased to 357.745 kWh. This a decrease of energy consumption by ***51,82%*** in a year and ***reserve the direct energy costs of public lighting by million HUF 20***, however the maintenance costs of the system became also lower.



Source: Pappné Horváth, B. (2015)

Relation to Smart City approach of the project

1. Cost-effectiveness – ***decrease of costs***.
2. Better lighting – ***better public safety***.
3. Survey of the entire public lighting system of the city – ***public lighting audit***.
4. *In the Earth the LED based public lighting may decrease yearly energy consumption for this system by 50 per cent.* Using this technology the CO_2 emission of cities would decrease by around 670 million tons. It means that a more efficient public lighting system may reduce the CO_2 emission to the half of the actual amount which would have *high importance related to climate change adaptation and mitigation.* ***Sopron contributed to this with an annual decrease of 360 tons.***

Source: Pappné Horváth, B. (2015)

Sopron – Towards a SMART CITY

Based the rapid development of digital world, more and more digital services supplier try sell their product for city managements every day.

The basic steps towards a smart city agenda:

1. *smart city audit – analysis*
Cites does not know the capacity of infrastructure and ICT services, and the attitudes of local citizens.

2. *smart city strategy – vision*
Medium or long term development plan including financial resources .

3. *action plan* – multi-annual, programming

4. *monitoring* – analysis of results.

Source: Pappné Horváth, B. (2015)

Smart City model and scale of community

Nagypáli (500 inhabitants) – ‚Green rout' local development program since 1996

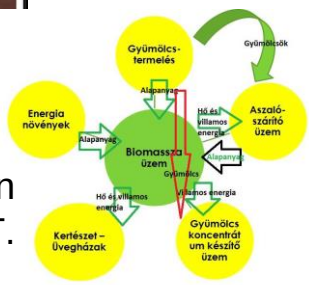
- use of renewable energy
- sustainable tourism
- local products
- community development

Solar energy and use of LED

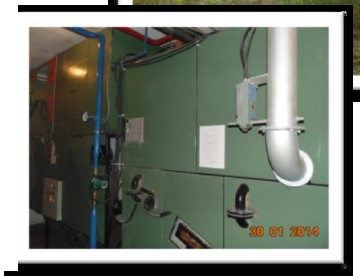
Reserving water

E-mobility and environment friendly public transport

Complex energy use and production system



Source: Based on Kócse, T. (2015)



Smaragd tree

Role of government

Set up pilot programs

- China: 299 cities and city regions
- India: 100 cities

Standardization

- indicators
- process

Platforms

- knowledge share

Source: Wan B. (2015)

Are these really smart city solutions?

LED lighting

Solar energy park

CONCERTED ACTION ENERGY EFFICIENCY DIRECTIVE

What makes a city smart?

By the use of ICT based measured and connected systems,

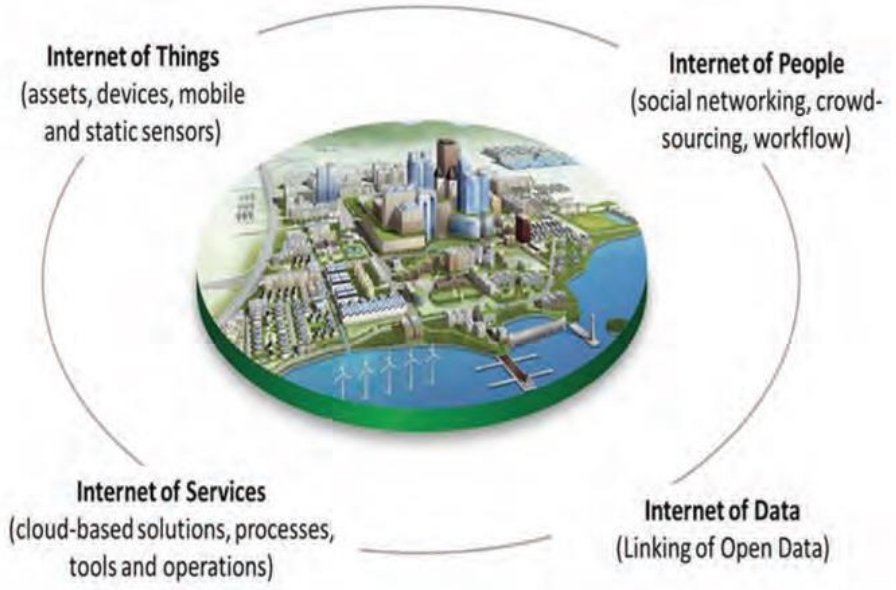
providing efficient, reliable and transparent

public services, and

ensuring sustainable

and liveable environment

in cooperation with local citizens.



Source: ISO/IEC (2014)

Conclusions (for not only cities!)

We have only one EARTH!
Cities and local communities has responsibility to save it for our future generations

SMART CITY MODEL MAY CONTRIBUTE TO FULFIL THIS OBJECTIVE OF SUSTAINABILITY BY

- ***Local policy:*** smart city vision
- ***Planning:*** **long term energy vision**, smart city strategy, roadmaps and action plans
- ***Development of smart solutions:*** smart pilots and CityLabs
- ***Partnership:***
  - *with local community:* information flow, inclusion
  - *share and exchange of knowledge:* smart city platforms and networking

Thank you for your attention!

Dr. Mihály Lados

senior research fellow, associate professor

West Hungarian Research Department of Institute of Regional Studies
Centre for Economic and Regional Studies of the Hungarian Academy of Sciences
Liszt F. u. 10., H-9022 Győr, Tel: +36 96 516 570, Fax: +36 96 516 579
E-mail: **ladosm@rkk.hu;** web: **http://www.rkk.nyuti.hu**