SMART CITY MODEL IN SMALL AND MEDIUM SIZED CITIES

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Plenary session 1

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Prologue

Boston: CityScore

Better use of data could make cities more efficient and more democratic

What the mayor saw?.

ÃMARTIN WALSH, the mayor of Boston, keeps on top of what is going on in his city.

His office is dominated by a dashboard, a large screen packed with constantly changing snippets of text, numbers and charts (pictured).

The central piece of information is the ***ñCityScoreò,*** a single number to ***indicate Bostonôs overall health***. It combines 24 different metrics, from crime to Wi-Fi availability, energy consumption and grants for the arts.ò

Source: The Economist March 26th 2016
http://www.economist.com/news/special-report/21695194-better-use-data-could-make-cities-more-efficientand-more-democratic-how-cities-score

The dark side of smart city

What is smart city?

a mayor

a city planner

an university

a public service/utility company

I am

an IT company

a government office

a civic/non-profit organisation

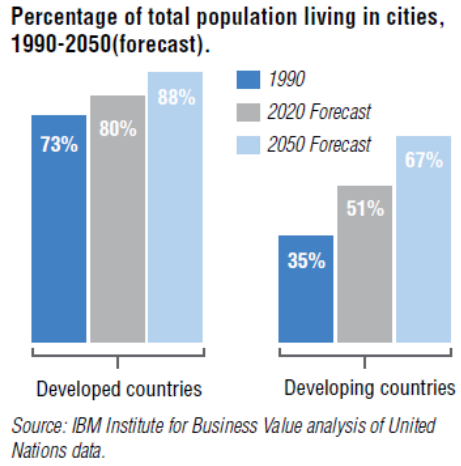
A CITIZEN

Content

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

Smart City Model

Challenges



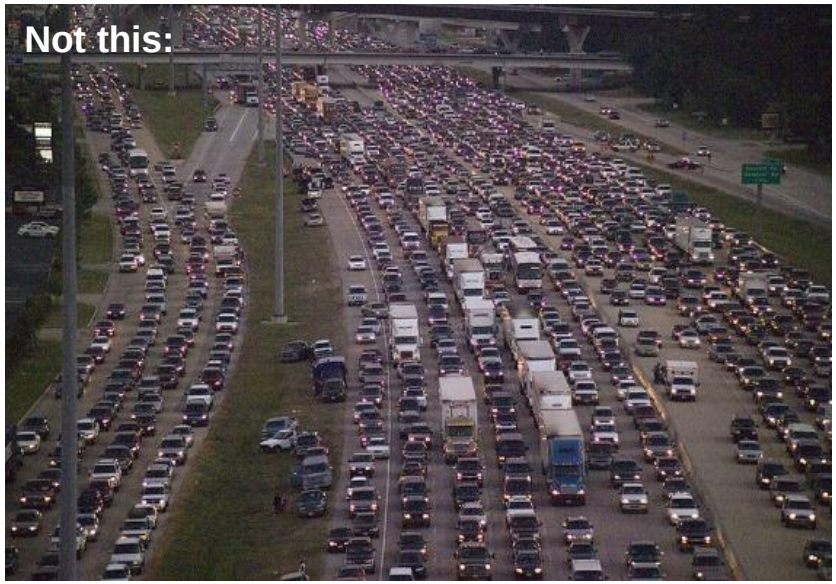
growing urban population

→ **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%
Increase the energy efficiency	20%	27%

Smart City & Communities calls by the European Union

Code of the call	Date of the call	Deadline	Finance (MEUR)
SCC-01-2016 Smart Cities & Communities	8 December 2015	5 April 2016	60,0
SCC-02-2016 (1st stage) **SCC-03-2016** **SCC-04-2016** Sustainable cities through nature-based solutions	10 November 2015	8 March 2016	40,0 15,0 5,0
SCC-01-2017 Smart Cities & Communities	4 October 2016	14 February 2017	71,5
SCC-02-2017 (1st stage) Sustainable cities through nature-based solutions	8 November 2016	7 March 2017	40,0

Urbanization

Ildefonso Cerdá (1867)

La Teoría general de la urbanización (Theory of Urbanization)

- definition of urbanization
- the unity of the theory and practice of urban planning and construction:
  improvement of the overcrowded, unhealthy cities, the inconvenient, bad social environment and the physical, transport and living conditions, which are barriers of the economic development and the reduction of existing social inequalities
- urbanization of rural settlements
- ruralization of cities

We would say in the 21st century: **LIVEABLE CITY**

Global strategies ï Smart world models

IBM: Smarter Planet

- instrumentation
- 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

Smarter Planet – IBM 2008

Instrumentation:

Instrumentation, or digitalization of a city's system means that the workings of that system are turned into data points and the system is made measurable. By 2010 there is likely to be 1 billion transistors, the building block of the digital age, for every human being.

Interconnected:

means that different parts of a core system can be joined and "speak" to each other, *turning data into information*.

Intelligence:

refers to the ability to use the information created, model patterns of behavior, or likely outcomes and translate them into real knowledge, allowing informed actions.

Source: Pongrácz (2013)

Smart City, the Urban Trinity

Information cyber city:

Digital/ICT/Hi-Tech/Ubiquitous/Cyber/Digitally Smart and Intelligent City

(Digital/Information Capital; Digital Urban Spaces, Multi-Play Telecom Network, ICT spaces/systems/applications, Sensor Networks, Ubiquitous Computation, Cloud Computing, Network-integrated Real Estate, City OS, Intelligent City Management Platform, Augmented Virtual Reality, Virtual Lifestyle)

Ecologic/clean city:

Sustainable/Ecological/Green/Zero-Carbon/Zero-Waste/Eco Friendly/Solar City

(Natural Capital; Natural Urban Spaces and Ecosystems, Green Energy Network, Real Eco Estate, Ecological buildings, Green Lifestyle)

Intelligent/knowledge city:

Knowledge/Learning/Innovation/Intelligent/Science/Intellectual/LivingLab/Creative/ Human City/Noopolis

(Knowledge Capital; Innovation Systems, Meaningful Urban Spaces, Collective Intelligence, Knowledge Triangle/Ecology, Health Triangle, Human Social City, Intelligent/Smart Lifestyle)

Source: Abdoullajev (2011)

Smart City Definitions

International Telecommunication Union's (ITU) Focus Group on Smart Sustainable Cities:

Smart sustainable cities: An analysis of definitions ï
Technical report (October 2014)

- **8 categories:** (1) quaility of life and lifystyle, (2) infrastructure and services, (3) ICT, communication, intelligence and information, (4) people, citizens and society, (5) environment and sustainability, (6) governance, management and administartion, (7) economy and finance, and (8) mobility.
- **6 primary indicators:** smart living, smart people, smart environment and sustainability, smart government, smart mobility and smart economy
- **30 key issues** (pl. ICT, safety, economic growth, well-being etc.)
- **116 identified**, categorized (pl. academic, governmental, non-profit, user oriented) **definitions**

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

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

REAL CORP 2014

PLAN IT SMART. CLEVER SOLUTIONS FOR SMART CITIES

(21-23 May 2014, Austrian Economic Chamber, Vienna, Austria)

Questions raised by REAL CORP 2014:

- What does ñSmart Cityò mean in terms of quality of life?
- How does it influence the economic perspectives?
- Are the concepts of sustainability and resilience part of ñSmart Citiesò?
- What about politics and administration, policies and governance?
- How do ñSmart Solutionsò influence the ñhardwareò of a city, the urban fabric?
- What is the role of urban/spatial planning in and for ñSmart Citiesò?

http://www.corp.at/index.php?id=47

REAL CORP 2016

SMART ME UP! How to become and how to stay a Smart City, and does this improve quality of life?

(22-24 June 2016, Hamburg, Germany)

Questions raised by REAL CORP 2016:

- How to become a Smart City?
- How to stay a Smart City?
- Smart Cities in Europe, America, Asia, Africa, Australia ï same or different?
- The role of innovation in Smart Cities
- Smart Data in smart spatial services for Smart Governance
- Low-Tech Smart Urban Solutions
- Smart Cities and Technologies of the Past Centuries
- Standardisation attempts for Smart Cities

http://conference.corp.at/index.php?id=3&L=0

What Cities Can Do?

Smart City ï 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
  ï collecting good practices and knowledge transfer
  (eg. Sustaina 100 ï 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.

The first Smart City research in Europe

2007: TU Wien, TU Delft, Univ. Ljubljana

www.smart-cities.eu

- **70 European medium size cities (over 100,000 and under 500,000 inhabitants)**

- **74 Eurostat based indicators (6 fields)**

The first Hungarian Smart City research

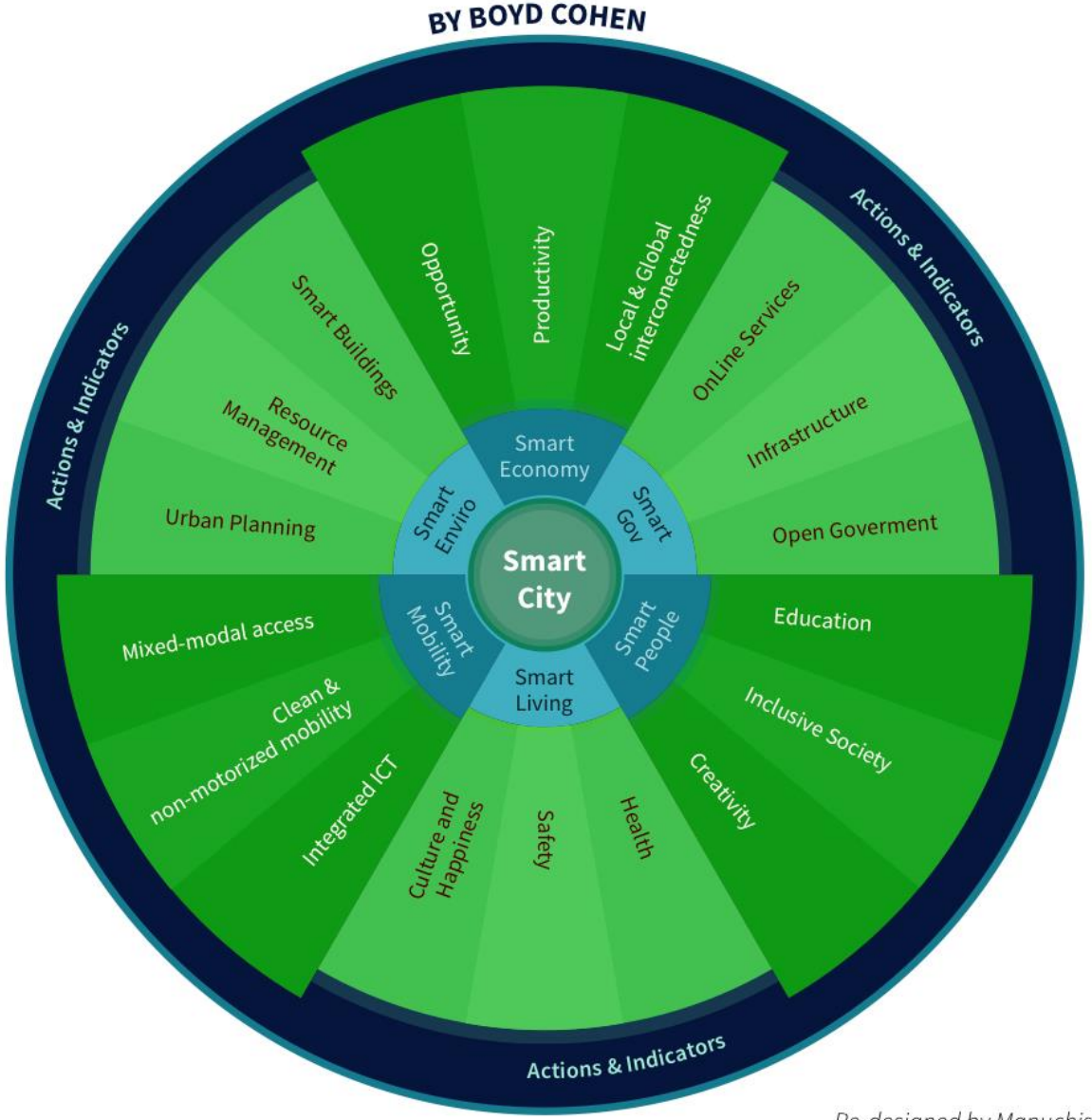
2011: IBM Hungary ï WHRI CRS HAS

„SMART CITIES – OKOS VÁROSOK”

Elmélet – Módszertan – Források – Külföldi jó gyakorlatok – Hazai esettanulmányok

http://www-05.ibm.com/hu/download/IBM_SmarterCity_20110721.pdf

Smart City Wheel



Source: Cohen (2014)

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, Mobility, 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 mobility, 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 ï The City for Life

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

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

Key elements for Smart Vienna:

- *Policy and vision:*
  ĂSmart City Wienòinitiative 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.*:* citizenôs solar power plant, car-free living, Bike City,
  aspern Viennaôs Urban Lake Side, Marxbox: ĂGreenòLaboratory Building

https://smartcity.wien.at/site/en

Smart City Models in Hungary

Smart city initiatives in Hungary

Attitudes of Hungarian Cities

Cities

1. with Smart City Strategy (e.g. Veszprém)
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 (pl. Szolnok ï 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)

ĂPannon-Knowledge-Park" project ĂSmart Cityò subproject

Pre-study for a smart transport and partner based public services development project

Key components of the Smart City Strategy:

1. Real time, client-oriented public transport
2. Public parking system and city card service
3. Partner based public service development
4. „Smart Net" for local citizens and visitors/tourists

Source: Józsa, T. (2015)

Pillar 1: Real time, client-oriented public transport

Modern, transport information system across the entire city for people using railway, local and interurban public buses, moreover individual motorised, cycling and pedestrian transport.

„Inteligent transport system"

This is IT system wish able to communicate with different technology platforms and mobile instruments. The system includes the following items:

- passenger information, dynamic route planner,
- traffic management,
- management of P+R parking places,
- fast reaction to accidents (real time cooperation with traffic management)
- electronic regional integrated tickets of the transport companies

Source: Józsa, T. (2015)

From intelligent GyŐr towards smart GyŐr

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

2003-2004: *Strategic Program of GyŐr* ï application of community planning: **Future dialogues**.

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

2006: *Growth Pole Programme of GyŐr (Autopolis)* ï cooperation of city-university-economy

2008: *Integrated Development Plan of GyŐr* ï one of the measure: implementation of the former Intelligent GyŐr programme

2011: *intelligent buses and passenger information system*

2013: *smart city of GyŐr* ï contract with E.ON Hungary (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)

2015: *Negotiations with Albacomp on smart solution* (IBM applications)

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 ï definition and vision

DEFINITION BY GYŐR:

GyŐr as Ăsmart cityò 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 Ăintelligentò (Ăsmartò) 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
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- ***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

Å ***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.

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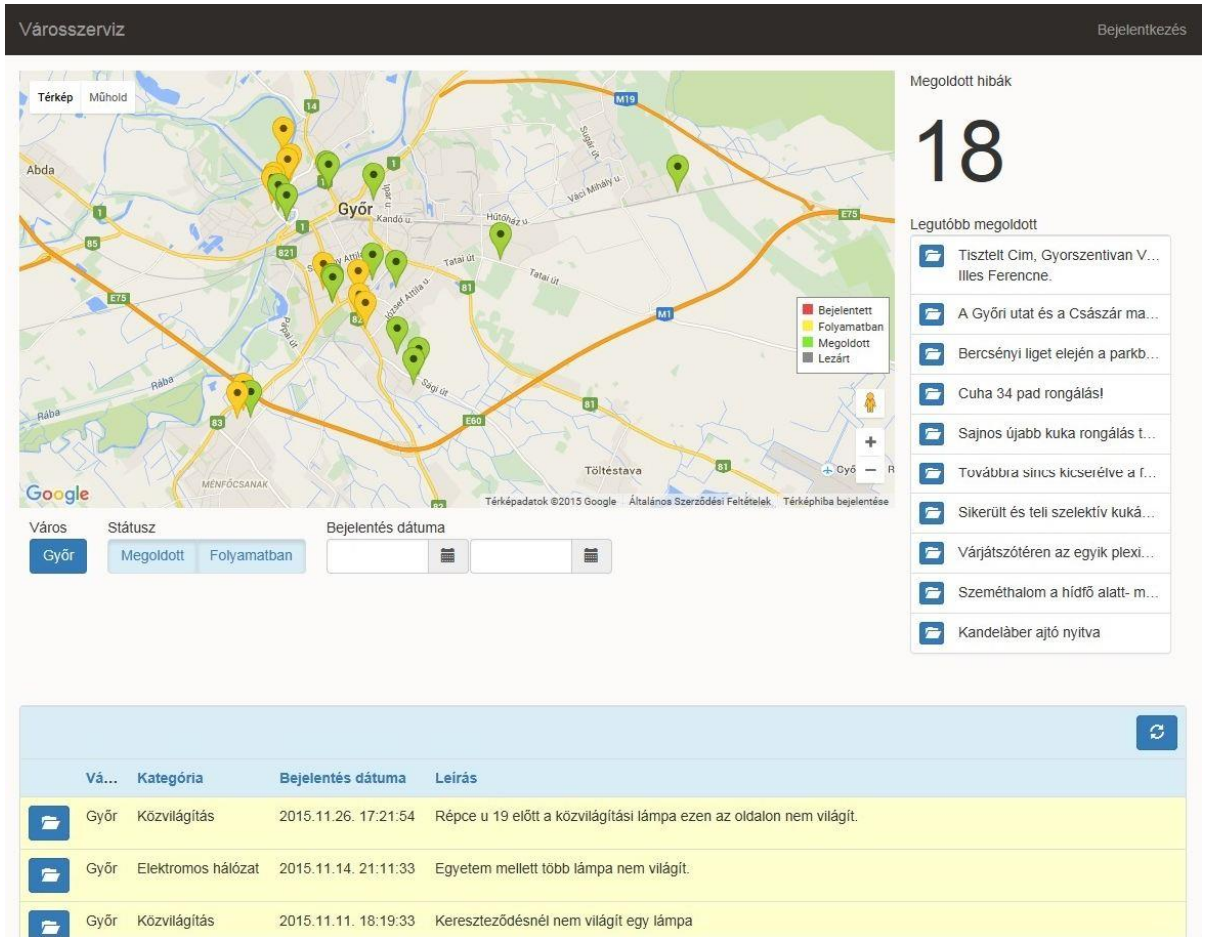
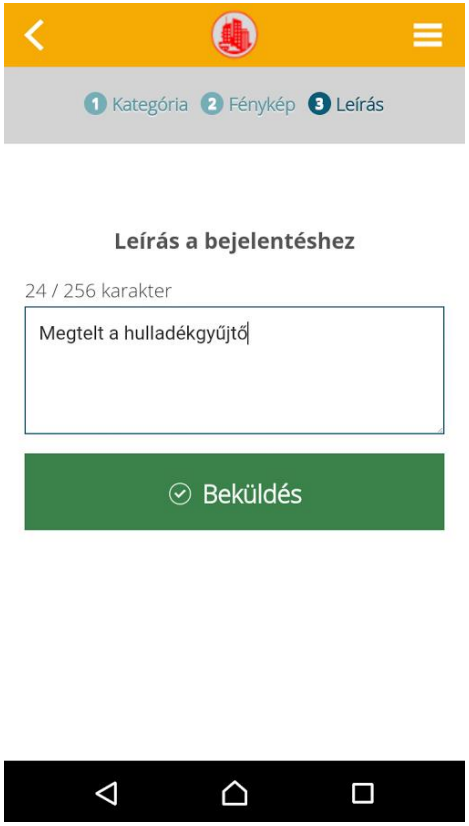
GyŐr i city service app 1

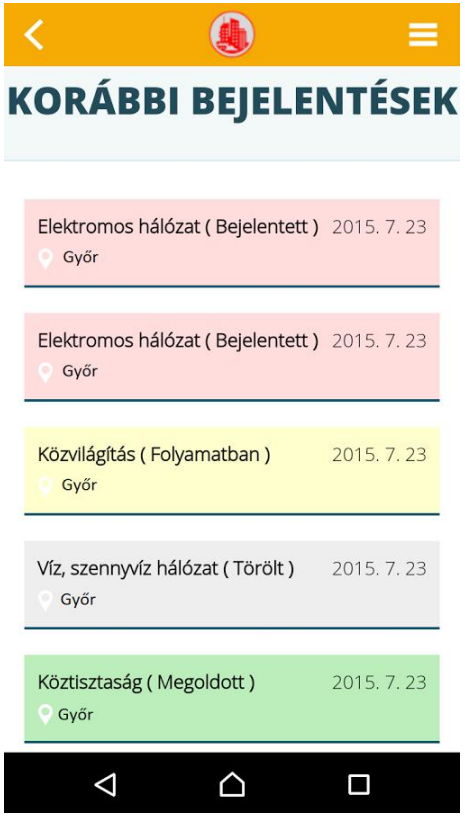


Source: https://varosszerviz.hu/

Egészség
Kultúra
Innováció
A jövő Győrben épül.

GyŐr i city service app 2





Source: https://varosszerviz.hu/

Experiences of GyŐr

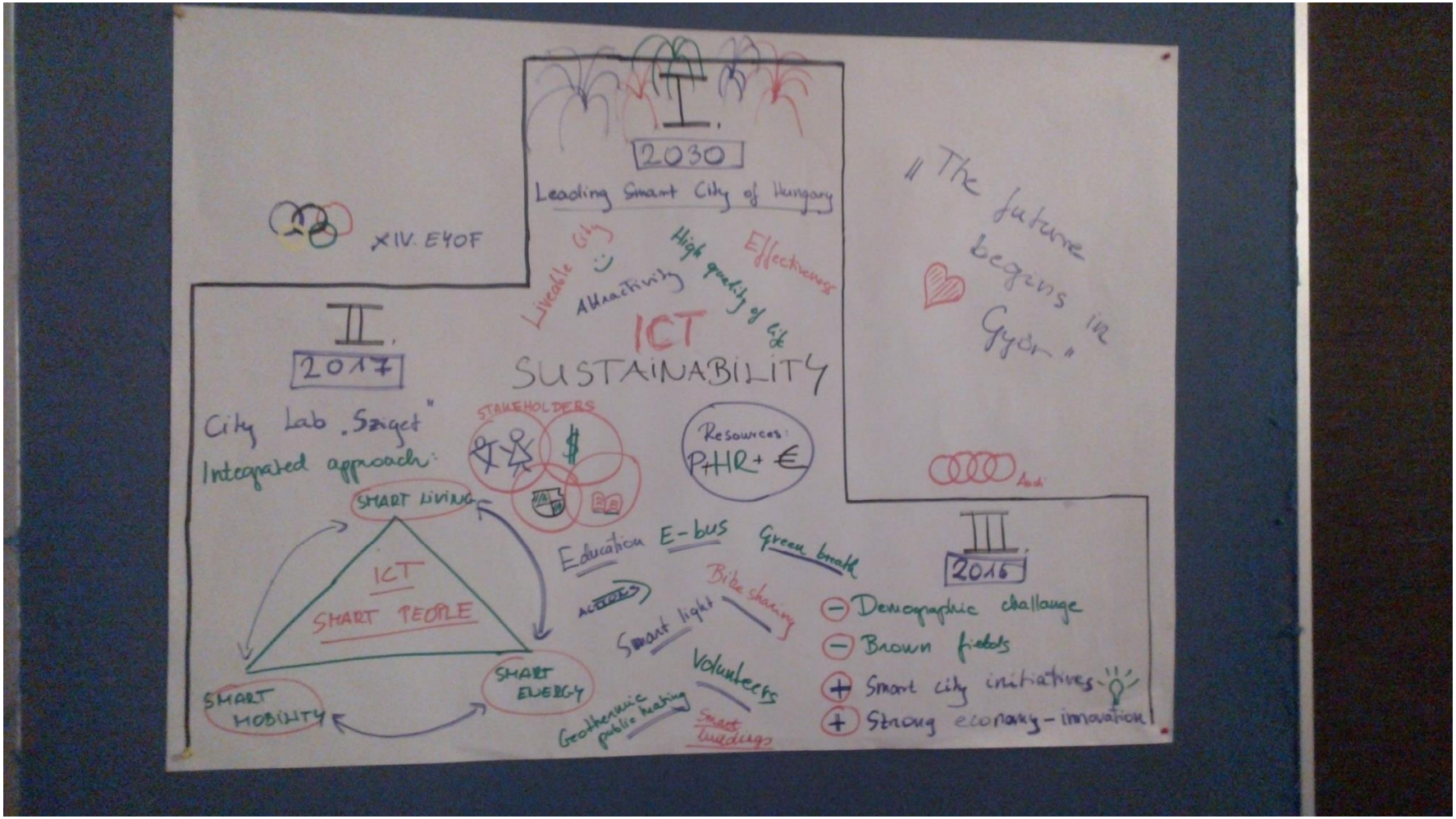
STRENGTHS

- political consensus
- 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 the smart services
- missing involvement of community
- centralisation trend of local public utilities at the national level

CityLab projects



Source: Smart City Coaching pilot training, Graz ï 30 November ï 04 December, 2015

Budapest ï smart civic initiatives

Smart CityLab (Budapest) – Design Terminal (+T-System)

2015: *The personal city*

1. The clean city
2. The aging city
3. Small data – local knowledge

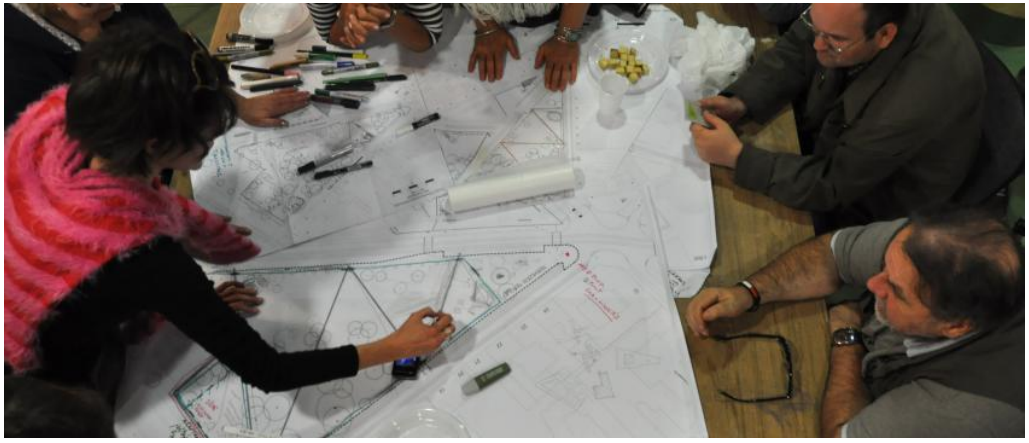
(http://smartcitylab.designterminal.hu/)

Smart City Budapest

Civic initiative

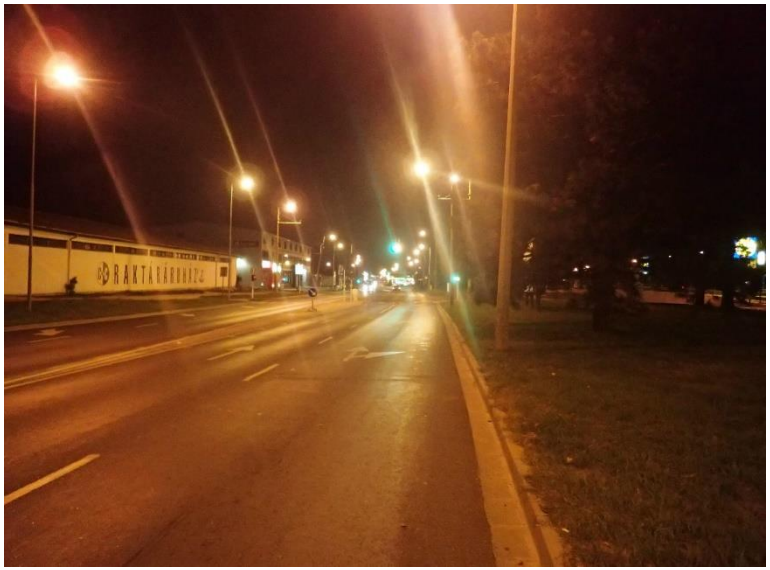
(Mindspace)

(http://smartcitybudapest.eu/hu)



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 ï ***decrease of costs***.
2. Better lighting ï ***better public safety***.
3. Survey of the entire public lighting system of the city ï ***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 ï 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

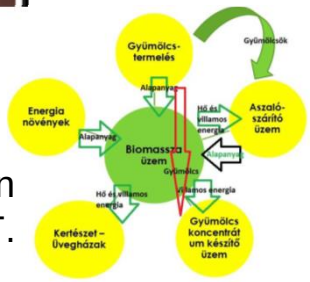
- use of renewable energy
- tourism
- local products
- community development

Solar energy and use of LED

Reserving water

E-mobility and environment friend public transport

Complex energy use and production system



Source: Based on Köcse, T. (2015)

Smaragd tree

Role of government

Set up pilot programs

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

Standardization

- indicators
- process

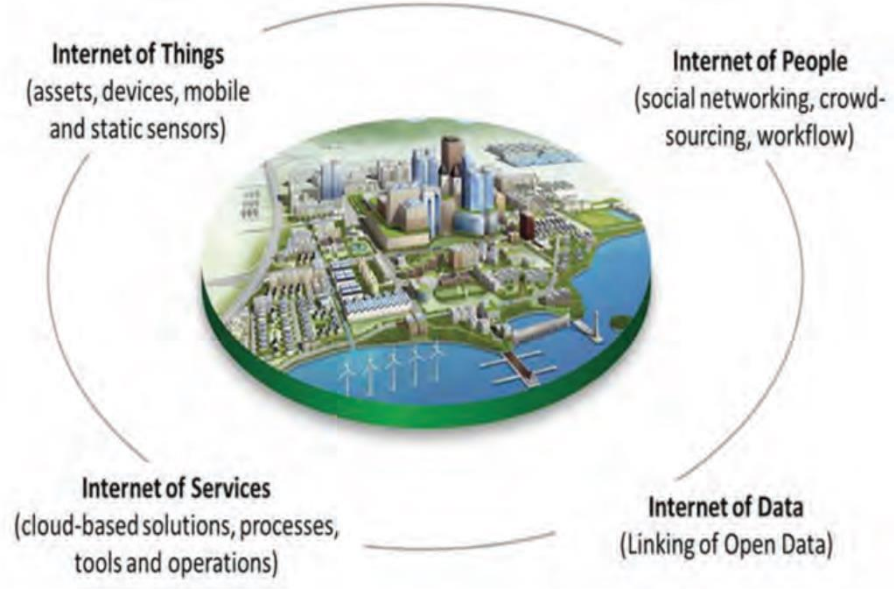
Platforms

- knowledge share

Source: Wan B. (2015)

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:*** smart city strategy, roadmaps and action plans
- ***Development of smart solutions:*** smart pilots and CityLabs
- ***Partnership:***
  - *with local community:* information flow, inclusion
  - *to share and exchange of knowledge:* smart city platforms and networking

Epilogue

Searching for partners

Research plan/topics:

1. What are the main trends in Smart City research?
2. What attitudes lead the decisions large and medium size cities related to Smart City development?
3. How smart city assessment may contribute to the decision making of local governments related to Smart City development?
4. How is community involved and participation measured?
5. Smart city is exclusively an urban issue or is there potential for smart life in rural areas?
6. How smart city approach may contribute to climate change adaptation of local communities?

Thank you for your attention!

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