

Quality of Life

- Smart Mobility
- Smart Infrastructure
- Smart People, Smart Living

- Smart Mobility “Sustainable Transformation”

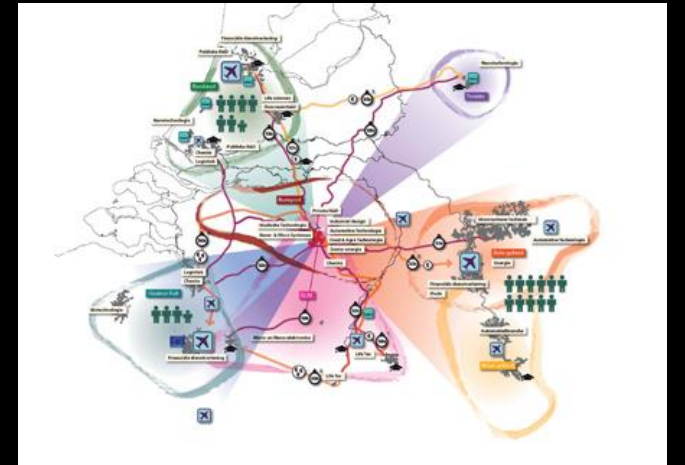


One may expect major changes regarding mobility in the near future. As mobility has always strongly influenced the way cities are organized and function, cities are expected to adapt quite fast too.

Take for example, the **solar powered car Stella**, created and built by a team of TU/e students. Starting from the idea that some decades from now, urban transport will be largely based on solar mobility it is unlikely that people will still park their car underneath a building in an underground parking garage. **People will be more likely to park their car in the open**, or even at the roof level of buildings. Can you think of the consequences and **what will we do with the vacant underground space?**

[research topic: Having solar cars may lead to a mobility platform that produces energy instead of using it. This might transform society tremendously. For instance, what if solar cars are connecting when charging in between rides? Will we have to reconsider our opinion regarding parking lots and parking problems, shifting from ugly fields of sheet metal to powerful solar power plants?

- Smart Infrastructure “Quality of life”



- Changes regarding mobility affect infrastructure and may lead to a different way of looking at a city. Maybe a city is no longer considered a compact unity with one core as city centre. For infrastructure that acts as a complex network, the many interchanges become the governing environments. Concepts such as **Brainport city** as a super village might become prosperous

- Smart People, Smart Living “Quality of life”



- Today's economical changes combined with new possibilities by digital and telecommunication **technologies affect the way people live and work.**
- For instance, an increasing part of the working population is self-employed .
- This number has risen from 1 out of 17 (two decades ago) to 1 out of 7 (last year). One might notice the effects of this change in the use of office space (and probably in the vast amount of vacant offices too). Changes in the way people cooperate, however, will result in other **effects on city life as well**

Smart Mobility in Smart City

#Smart city # Smart mobility # Digital city #Benefits IT

- Smart Mobility, a **winning strategy** to cope with some severe urban problems such as traffic, pollution, energy consumption, waste treatment.
- Aiming at reducing its environmental footprint and at creating **better quality of life** for citizens.
- It involves both **environmental and economic aspects**, and needs both high technologies and virtuous people behaviors.
- Smart Mobility is largely **permeated by IT**, used in both backward and forward applications, to support the **optimization** of traffic fluxes, but also to collect **citizens opinions** about live ability in cities or quality of local public transport services.
- The aim of this paper is to analyse the Smart Mobility initiatives and to investigate about the **role of IT** in supporting smart mobility **actions**, influencing their **impact** on the citizens' quality of life and on the public value created for the city as a whole.

During the latest 50 years, **city dimensions** have been increasing more and more, all over the world. By 2050, **70 %** of population will live in cities. Cities are both places of opportunities and places of diseases.

Opportunities, because cities are places where people live and meet, where **companies**, **residence** and **schools** and **universities** are most present.

Diseases, because in **city traffic**, **pollution** and **waste production** are worse than elsewhere and the cost of living is very high.

Mobility is one of the most important facilities to support the functioning of the urban area. However, transport produces several severe **negative impacts** and problems for the quality of life in cities, such as: **pollution**; **traffic**; street **congestion**; long **time** to cross the city and therefore a negative impact on work and life balance; **high cost** of public local transport services; and so on.

Therefore, **Smart Mobility** is one of the most promising topics in Smart City, as it could produce **high benefits** for the quality of life of almost all the city stakeholders.

1)) Smart City and Smart Mobility: Some Reference Models.

Smart City vision, smart mobility and strategies.

1. Digital city: it regards the use of IT to support the creation of a wired, ubiquitous, interconnected network of citizens and organizations, sharing data and information and joining online services, supported by public policies such as e-government and e-democracy. The traffic system could use IT and software applications for a lot of different aims, such as optimizing traffic fluxes, support effective public transport routes, collect citizens' opinions and suggestion about urban mobility, and so on.
2. Green city: it regards an ecological vision of the urban space, based on the concept of sustainable development. Green policies in city regard both reducing the city footprint on the environment, reducing pollution waste and energy consumption, and preserving or creating public green areas like parks and gardens. Environmental impact of transport in city is one of the main causes of pollution.
3. Knowledge city: it regards the policies aiming at enforcing and valuing data, information and knowledge available and produced in city, especially through its cultural institutions, but also produced and used by companies, innovative distrITs, technological parks. Smartness of transport depends also on the sharing of civic values and on the citizens' smart behaviors.

Smart Mobility **objectives** summarized in the following six categories

1. Reducing pollution;
2. Reducing traffic congestion;
3. Increasing people safety;
4. Reducing noise pollution;
5. Improving transfer speed;
6. Reducing transfer costs.

2)) The IT Governance and Service Model : **Basic Principles**

Smart Mobility Actors: who are the main agents moving the smart initiatives.

- Public transport companies and organizations;
- Private companies and citizens;
- Public bodies and local governments;
- The combination of all of them, when all these actors realize together integrated initiatives

All the initiatives carried out by the **companies or organizations** suppling the local **public transport** services. It is composed by actions of different nature but characterized by a common factor, that is, they aim to **positively change** the quality of public transport under different points of view.

This set collects either solutions involving a change in the **fleet of transport vehicles** and **fuels** (such as the adoption of **electric vehicles, vehicles EUR 5, vehicles with automated driving or CNG vehicles**) or interventions which improve the quality of public service without however impinging on vehicles (such as the introduction of an **integrated ticketing** system or the provision of **collective taxis**).

1. Public mobility: vehicles and innovative transport solutions

- Electric vehicles
- Vehicles EUR 5
- Use of alternative fuels (LPG, methane, hydrogen, bio-diesel, and fuel cell)
- Vehicles with automated driving
- Integrated management of public transport vehicles
- Collective taxis
- Integrated ticketing system

2. Private and commercial mobility : vehicles and innovative transport solutions

- Car sharing (with dereferencing and geotagging)
- Car pooling
- Hire and ridesharing services
- Bike sharing (with geo-referencing and geo-tagging)
- Automotive navigation system
- Eco-driving

3. Infrastructure and policies to support mobility

Infrastructure, changes and addressing mobility

- Parking
- Park and ride
- Bicycle lanes
- Columns recharge electric vehicles
- Message signs about mobility
- Integrated traffic light
- Pedestrian zones or auto-free zones
- Restricted (or limited) traffic zones
- Bus lane or bus only lane
- Parking guidance system
- Systems for speed control and management
- Mobility management based on the level of pollutant emissions

Integrated policies to support smart mobility initiatives

- Traffic flows division (private, public, commercial)
- Integrated ticketing
- tariff integration between public and private transport
- Incentives for the use of less polluting fuels
- Control of emissions
- Speed limit sign
- Economic incentives and/or higher taxation measures (congestion pricing, Eco pass, cordon pricing, road pricing, park pricing)
- Tax incentives and/or measures such as higher taxation on polluting fuels
- Regulation of access (pedestrian areas, time bands, ZSL, STL)
- Redesign of city times (public schedules, school schedule etc.)
- Redesign of the city and its spaces (residential and industrial areas, integrated neighborhoods etc.)

4. Systems for collecting, storing and processing data, information and knowledge aimed to design, implement and evaluate policies and integrated initiatives of smart mobility.

- Demand control systems for **access to reserved areas** (congestion pricing, electronic tolling, and electronic tolling with GPS, pay as you drive)
- Integrated **parking** guidance systems
- Variable Message Signs (VMS)
- Urban Traffic Control (UTC)
- **Video surveillance** systems for area and environment security
- Integrated systems for mobility management
- **Traffic data** collection systems (section control, variable speed limit control, ramp metering etc.)
- Expert systems for the correlation and filtering of events (Automatic Incident Detection—AID)
- addressing and control systems of urban and suburban traffic (section control, ramp metering, variable speed limit, activation of the emergency lane for congestion)
- Systems for the **management of fleets and logistic**
- Systems for managing fleets of vehicles of **public transport** adapted to UTC (system of planning, monitoring and reporting of public transport service, integrated electronic ticketing system, information system for users of public transport)

Infrastructure and Policies Supporting Mobility

1-

Infrastructural projects which, in different ways, affect urban mobility: for example, the **creation of bicycle lanes** or interventions aiming at changing mobility as the creation of restricted traffic zones. The expansion or creation of bicycle lanes is an intervention that is closely linked to the use of the bicycle as a mean of private transport and could have **positive effects on the spread of bike-sharing**; initiative that, despite the difficulties linked to the **topography** of each city and the possibility of **theft**, led to a **modal shift from car to bike from 2 to 10 % in cities like Paris, Montreal and Lyon**.

The closure to traffic of certain urban areas for time zones or periods of the day in order to reduce pollution and congestion represents another interesting solution adopted by municipalities. among the major objectives sought by the **LTZ (Limited Traffic Zone in Italy)**, there may be safety compliance, particularly in the city Centre, especially in the peak hours of **pedestrians**, the reduction of pollution levels and the increase in revenue administration where it is expected to pay a **congestion charging**.

2-

A **series of integrated policies** that can be implemented to change the mobility system, in particular by the **public decision** maker (for example: incentives for the use of **less polluting fuels**, tax incentives or measures such as **higher taxation on polluting fuels**). Other interventions that may alter the urban mobility may be the **redesign of the city** and its spaces (residential and industrial areas, integrated neighborhoods etc.).

Smart Citizen in Smart City

#Smart cities #electronic participation #transparency

The “smart city” is an umbrella for cities that use information technology to **improve services and provide better quality** of life for its citizens. Citizen **participation** is often highlighted as an important part of the smart city concept. Participation can be **political** – influencing political decision making, but also **non-political** where citizens participate to help the city solve its problems.

Introduction

Smart city has been coined as a term to describe urban development based on improvement of quality of life, better services, reduced environmental footprint and sustainability. **Technology is an important part of the “smart city” concept.** Most definitions rely on **the use of information and communication technology** IT allows the city to manage **vital functions** and create added value. Use of technology relies on **data collection** from various sources, and “Big data” plays an important role to achieve “smart city” objectives. Such data is coming from a variety of **sources**: Sensors (including real-time video, “**human sensors**”, **social media and open data sets**).

This paper focuses on citizen participation in the context of the smart city. Concept of interaction and participation in general as well as participation as taking part in political decision making. **Citizens plays role as experts and volunteers.** **Experts share their competence, volunteers share their time**, but they share to help their city become better and smarter.

The Role of Citizens

Participation is an important manifestation of democracy. Direct democracy (Held, 2006) implies that citizens have the power to make political decisions by themselves. In an Indirect democracy, political decisions are made by elected representatives. The citizens may decide not to reelect representatives if they are dissatisfied with their performance.

Direct Democracy---

Binding (local) referendums is probably closest to the ideal of direct democracy. The citizen's vote on specific issues, and the result cannot be disputed by elected representatives. But binding referendums are rarely used, both for legal and political reasons.

Ex. Switzerland is the most well-known example where local (binding) referendums are used.

Ex. Participatory budgeting has become widespread, where citizens vote on the use of a part of the total budget for a city. Cities having implemented various forms of participatory budgeting In this case, the allocation of funds is a direct consequence of the participation. Participatory budgeting is a powerful mechanism to make participation work. The incentive to participate is high, since the citizens will see direct results from taking part in the decision making.

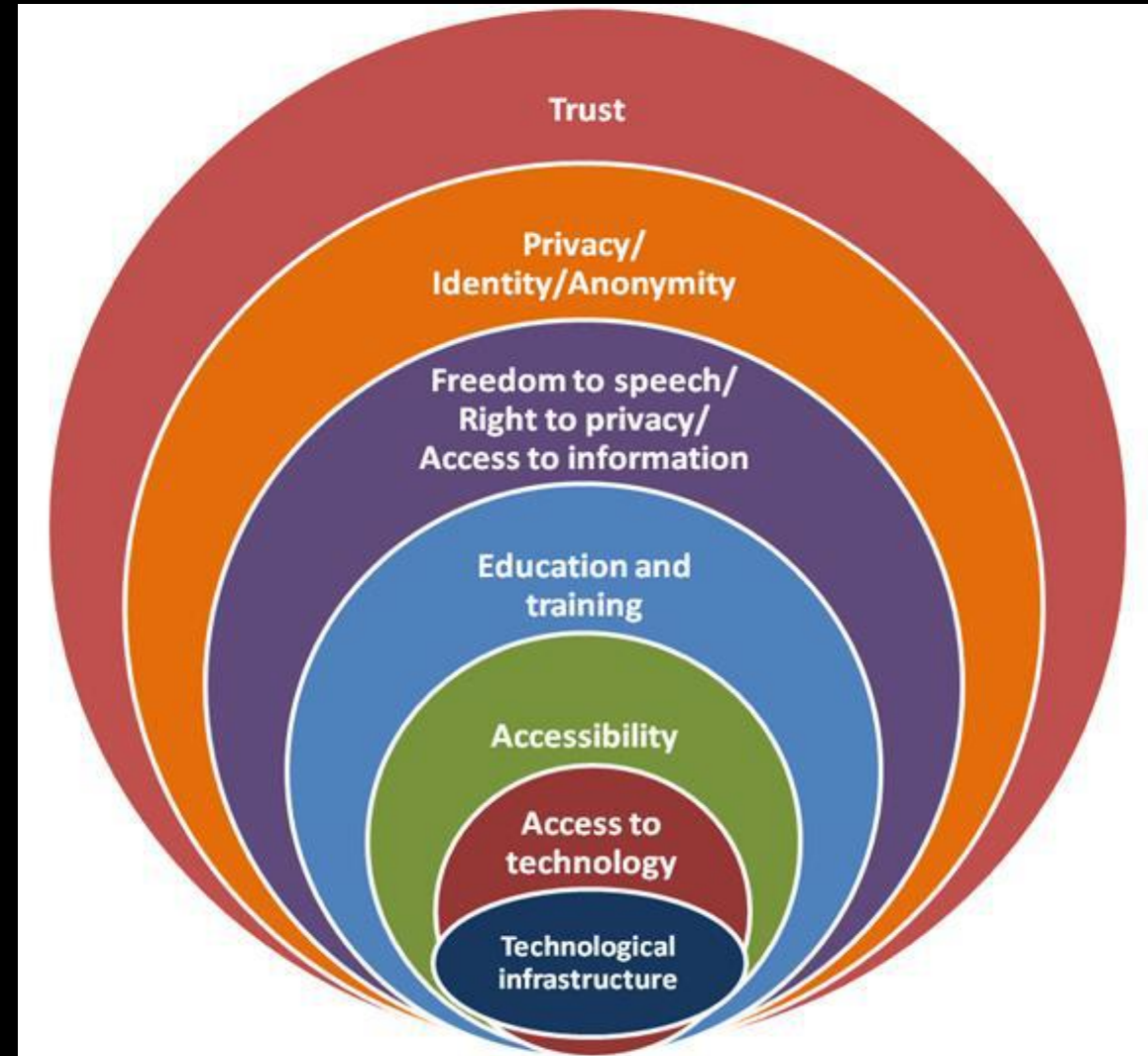
Indirect Democracy--

Indirect democracy is the common model in western democracies. The citizens vote for parties or representatives to act on behalf of themselves until the next election. To give citizens more influence on agenda setting, different tools have been implemented i.e. petitions, consultative referendums and consultations.

The Prerequisites of Electronic Participation

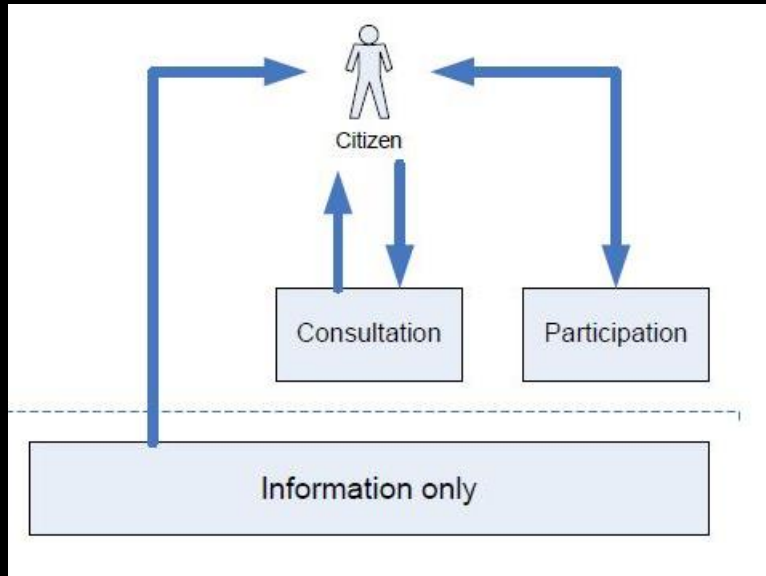
(Berntzen and Karamagioli 2010) developed a model to show the prerequisites for taking part in the Digital society.

First, a **suitable infrastructure** must be in place. This can be wired or wireless. The Infrastructure is necessary to establish the connection between the citizen and the participatory platforms. The citizen also needs access to technology, either through his/her **own device** (personal computer, tablet or smartphone) or through a **public accessible devices**. Also, **education and training** is necessary to be able to use technology in an efficient and meaningful way. Legal mechanisms are needed to protect such things as **privacy**, freedom of expression etc. It is also necessary to have some technical **mechanisms** to make sure users are **authenticated** when required, but also to stay **anonymous** in other contexts. In the end, all these layers are necessary to achieve trust in, and adoption of the solution.



The Organization for Economic Co-operation and Development (OECD) (2001) developed a model that focuses on the level of interaction between the government and their citizens. Adapted (by the authors) to smart cities this model spans three different levels:

Political participation



- **Information only.** This is one way communication with no feedback from the citizens. The purpose is to keep citizens informed about political and managerial issues.
- **Consultation.** A two way communication where the citizens are asked for input on specific issues. The city decides on the issues to be discussed, and collects and process the feedback from the citizens.
- **Participation.** Citizens enter a partnership with the city, and take an active role in the political decision making. Citizens can raise issues they want to discuss, and the city listens for their inputs, digital interaction may improve the interaction between the city and the government. We will later discuss some tools that facilitates such interaction.

In order to take active part in political decision making, citizens need to be well informed about the recent history, current state, and future plans of the municipality or city. Therefore, the smart city must make necessary efforts to publish updated and relevant information. **Transparency** is foremost a legal issue. Most democratic countries have laws or other legal mechanisms in place to secure citizens access to public documents and records (Lidberg, 2009). A smart city will typically use information technology to improve the transparency and accessibility of such information. Transparency is not only about documents and records, but also meetings, processes, benchmarking, decision makers and disclosure of information

Tools of participation

Definition of smart cities implies the use of information technology to improve services and better quality of life.

ex. Some common tools used by Norwegian municipalities and cities are listed

Information

- .e-mail newsletter
- .Online mail records
- .Webcasts

Consultation

- .Consultations
- .Polling
- .Blogs

Participation

- .Discussion forum
- .Social network platforms(e.g., Facebook)
- .Participatory budgeting

Non-political participation

The following examples show how citizen can help their city and fellow citizens through non-political participation. The examples focus on digital participation, since the smart city concept relies on use of technology to make better services and improved quality of life for its citizens.

- Fix My Street

FixMyStreet (King and Brown, 2007) is an application that allows citizens to report on issues and problems through their computer or smart phone. The application is location based, it uses the address or **GPS** coordinates as a tag to show the exact location of the issue or problem. Typical problems are **holes in the road, broken light bulbs in street lightning, abandoned vehicles, broken water pipes** etc. FixMyStreet mobilizes citizens to alert the city administration when something needs to be fixed. The application also provides **feedback on status**. It is possible to see how fast (or slow) the city is responding to reported problems. FixMyStreet is widely used in United Kingdom, but the software itself is open source, and has been adopted by cities all over the world. In this case the citizens are acting as **human sensors**. They observe something is wrong and report it.

- Management and Monitoring of Bicycle Routes

A master student at the Norwegian University of Science and Technology (NTNU) developed an Android app for The Norwegian Public Roads Administration to **manage and monitor bicycle routes** (Khodambashi et.al., 2016). **City planners make assumptions about cyclists' behavior based on insufficient data.** The app provides more accurate information on which routes to improve based on feedback from cyclists. The app also provides information about such things as **speed** and relative **frequency of use of bike lanes**.

Field testing was done in Trondheim, Norway, and at the end of the trial period more than 50 people had downloaded and installed the app, and uploaded more than 100 trips. The collected data is visualized in a web-based interface, and provides city planners with valuable information for planning purposes.

- Sauberes (clean) Wiesbaden

Sauberes Wiesbaden (Clean Wiesbaden) is a **collaborative project** between Wiesbaden's waste disposal services (ELW), Wiesbaden Council and the RheinMain University of Applied Sciences (Böhm et.al., 2015). The project aims to promote the participation of the citizens to quickly and easily **report illegally dumped garbage** in the area of Wiesbaden, Germany. An Android smartphone app was developed to make reporting easy. The app uses the location data from the mobile phone to give exact position of the disposed garbage.

The mobile application was officially launched in the Google Play Store on October 9th, 2015. During **the first month** there were more than 1,000 downloads. In this period **469** events were reported. From those, **13%** were rejected due to duplicates, poor quality pictures, or because the report was located on a private or restricted area; while **87%** were successfully processed. When comparing the app with other methods like calls or emails, the overall number of reports generated with the app has increased by 134% (Böhm et.al., 2015).

- Green Watch Project

Another example is the Green Watch project (Ratti and Townsend, 2011). The project distributed 200 smart devices to citizens of Paris. The devices sensed ozone and noise levels as the citizens lived their normal lives, and the results were shared through a mapping engine. The project showed how a grassroots-sensing network could reduce monitoring costs dramatically, and at the same time engage citizens in environmental monitoring and regulation

- Safety-net

Safety-net is a self-help network (Berntzen, 2011). The initial idea was to provide self-help to next in lines of patients suffering strokes or dementia. The platform is run by a consortium of municipalities located in Vestfold county, Norway, and have later been extended to support parents of children with psychological problems, and relatives of drug abusers. The whole idea is to learn from other citizens experiencing the same situation. The platform includes video communication between network members, and access to a knowledge database with information written by medical professionals. The network is run by coordinators employed by the municipalities, and these coordinators also arrange off-line events.

Thank You