



University College  
of Southeast Norway

**Cities Being Smart**  
**Public Services Delivery and Citizen Centricity**  
**Lasse Berntzen**

# About me

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- Professor (Information Systems) at University College of Southeast Norway
- Eight campuses located south and west of Oslo
- 18.000 students
- Department of business, history and social sciences (Vestfold campus)
- Multidisciplinary team working on digital transformation and smart cities
- Several papers, book chapters and articles on smart cities

# Smart City Tutorial

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- Introduction
- Two research papers
- Public service delivery
- Own research
  - The role of citizens in the smart city
    - Open and transparent city
    - Political participation
    - Non-political participation
  - Is smart about size?
  - Recent project: Air quality monitoring
  - Citizen centricity

# *Introduction*

# Smart cities

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- Smart city is a concept
- Most definitions includes the use of computer technology
- Main objective is to improve quality of life for its citizens
  - Provide better services
  - Reduce environmental footprint, sustainability
  - Facilitate participation

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# What is a smart city?

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Smart cities are places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic, and environmental problems.

Anthony B. Townsend. (2014) Smart Cities, W.W.Norton & Company

# What is a smart city?

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"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".

ITU-T Focus Group on Smart Sustainable Cities (2014) Smart sustainable cities: An analysis of definitions

# What is a smart city?

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*“Projects of smart cities have an impact on the quality of life of citizens and aim to foster more informed, educated, and participatory citizens.*

*Additionally, smart cities initiatives allow members of the city to **participate** in the governance and management of the city and become active users”*

From Chourabi et al. (2012) Understanding Smart Cities: An Integrative Framework



# Smart Cities

Some application areas:

- Communication
- Culture
- Energy
- Emergency services
- Environment/climate
- Health
- Safety and security
- Tourism
- Transport
- Work

# Transport

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- Use data to make better traffic flow
- Examples:
  - Where is traffic jams, alternative routes?
  - Use traffic data to control traffic lights
  - Where to find an available parking spot?
    - Avoid driving around to find a free one
- Real time information on public transport

# Environment

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- Monitor environmental conditions
- When to enforce traffic restrictions (control pollution levels)
- Better public transport solutions (to reduce car use)
- Smart street lights (to conserve energy)
- Using renewable energy
- Teleworking (to reduce car use)

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# Safety and security

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- Improved emergency response services
- Surveillance cameras, sound detection
- Send messages or do automated phone calls to alert citizens of emergencies.

# Smart cities

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- Can be seen as an umbrella for research on public service delivery, environmental awareness and good governance
- But also the study of highly complex systems



# *Two research papers on smart cities*

# Background paper #1

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- **Smart Cities – Ranking of European medium-sized cities (2007)**
- One of the most cited papers on “smart cities”.
- Research done from April to October 2007
- Authors: Rudolf Giffinger, Vienna UT; Christian Fertner, Vienna UT; Hans Kramar, Vienna UT; Robert Kalasek, Vienna UT; Nataša Pichler-Milanović, University of Ljubljana; Evert Meijers, Delft UT
- 70 European cities

# Indicators

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- 74 indicators
- Indicators mainly derived from open data sources
- Some data collected by research team
- Coverage: 87% of the indicators



# Characteristics of a Smart City

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Smart Economy

Smart People

Smart Governance

Smart Mobility

Smart Environment

Smart Living

# Smart Economy (Competitiveness)

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- Innovative spirit
- Entrepreneurship
- Economic image & trademarks
- Productivity
- Flexibility of labour market
- International embeddedness
- *Ability to transform*

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# Smart People (Social and Human Capital)

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- **Level of qualification**
- **Affinity to life long learning**
- **Social and ethnic plurality**
- **Flexibility**
- **Creativity**
- **Cosmopolitanism/Open-mindedness**
- **Participation in public life**

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# Smart Governance (Participation)

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- Participation in decision-making
- Public and social services
- Transparent governance
- *Political strategies & perspectives*

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# Smart Mobility (Transport and ICT)

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- **Local accessibility**
- **(Inter-)national accessibility**
- **Availability of ICT-infrastructure**
- **Sustainable, innovative and safe transport systems**

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# Smart Environment (Natural resources)

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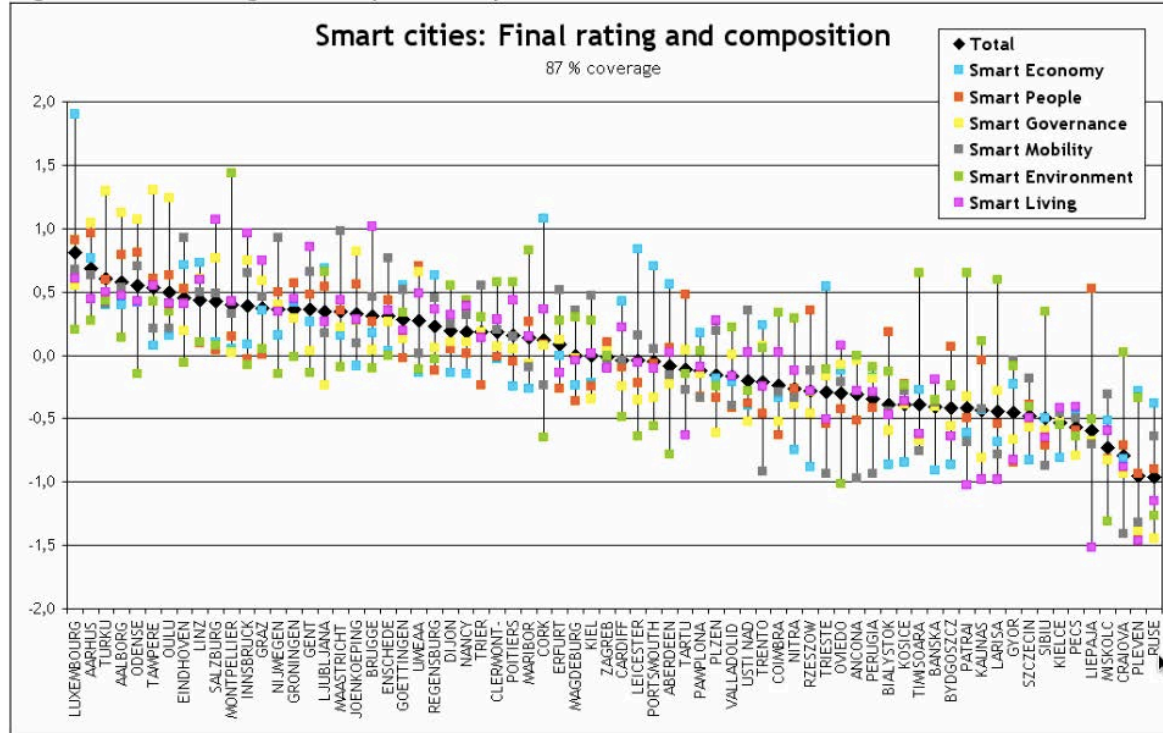
- **Attractivity of natural conditions**
- **Pollution**
- **Environmental protection**
- **Sustainable resource management**

# Smart Living (Quality of life)

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- **Cultural facilities**
- **Health conditions**
- **Individual safety**
- **Housing quality**
- **Education facilities**
- **Touristic attractivity**
- **Social cohesion**

# Results





# Background paper #2

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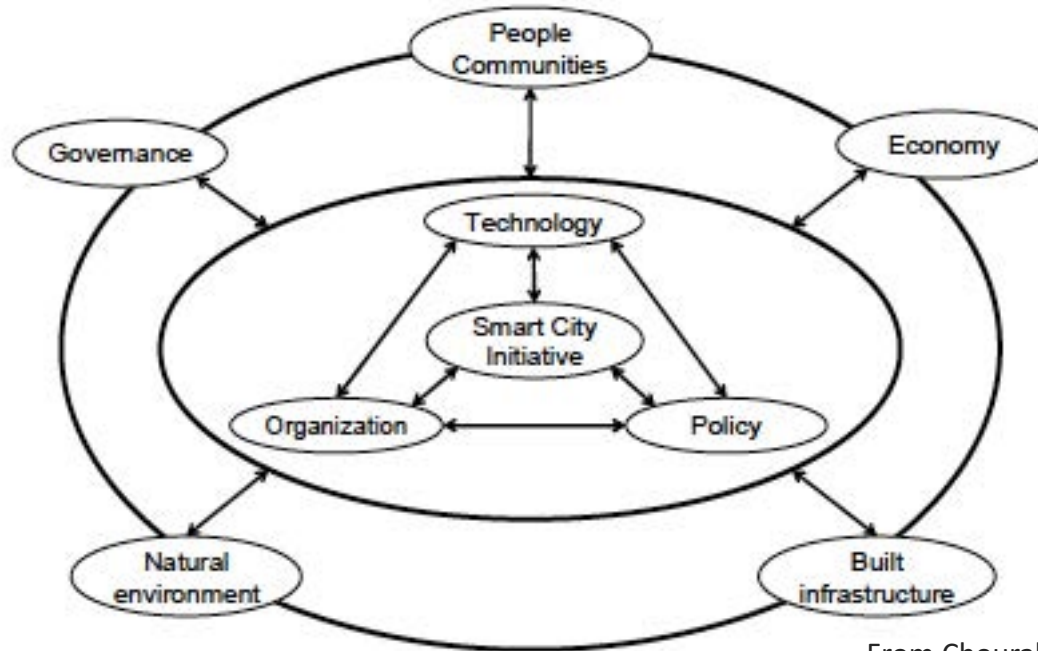
- **Understanding Smart Cities: An Integrative Framework (2012)**
- Authors: Hafedh Courabi, Taewoo Nam, Shawn Walker, J. Ramon Gil-Garcia, Sehl Mellouli, Karine Nahon, Theresa A. Pardo, Hans Jochen Scholl.  
Presented at 45<sup>th</sup> Hawaii International Conference on System Sciences (HICSS), 2012
- Different approach
- Based on a literature study
- Trying to extract characteristics of smart cities from a set of sources

# Success Factors and Challenges

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- Management and organization (silos, end-user involvement, alignment)
- Technology (IT skills, cross-sectoral cooperation)
- Governance (leadership, participation, accountability, transparency)
- Policy context (legal, political, institutional, culture)
- People and communities (digital divide, accessibility)
- Economy (efficiency, competitiveness, innovation, entrepreneurship)
- Built infrastructure (infrastructure, security and privacy, operational costs)
- Natural environment (sustainability)

# Smart city initiatives framework



From Chourabi et al. (2012) Understanding Smart Cities: An Integrative Framework

# *Public Service Delivery*

## *Smart services*

# Public Service Delivery

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- Citizens expect public sector to be just as user-centric as the private sector.
- Most services are delivered by employees, not by computers
- Some services can completely be delivered online
- Other services can be supported or enhanced by digital means

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# Public Service Delivery

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- Services that can be completely digitalized
  - Requesting information
  - Applying for permits
  - Tracking interactions with government/municipality

# Public Service Delivery

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- Services that can be supported or enhanced
  - Applying for physical services, e.g. kindergarten or nursing home
  - Making appointments and reservations for physical services
  - Payments for physical services
  - Providing feedback on physical services

# Efficiency and self service

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- City of Copenhagen, Denmark
- Average costs of citizen contact:
  - Personal appearance: 10 Euro
  - Telephone: 5 Euro
  - Digital self-service: 40 Cent
- Note:
  - Investments is not calculated
  - User experience/satisfaction is not discussed



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# Example Service: Prescriptions

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- Electronic prescriptions
- Faster – just a click to transfer prescription from the medical doctor to the pharmacy
- Better quality / less mistakes (it used to be handwriting)
- Harder to misuse

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# Virtual Office

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- City employees with virtual, mobile office
- No need to visit city hall
- They come to you

# ***The Role of Citizens in the Smart City***

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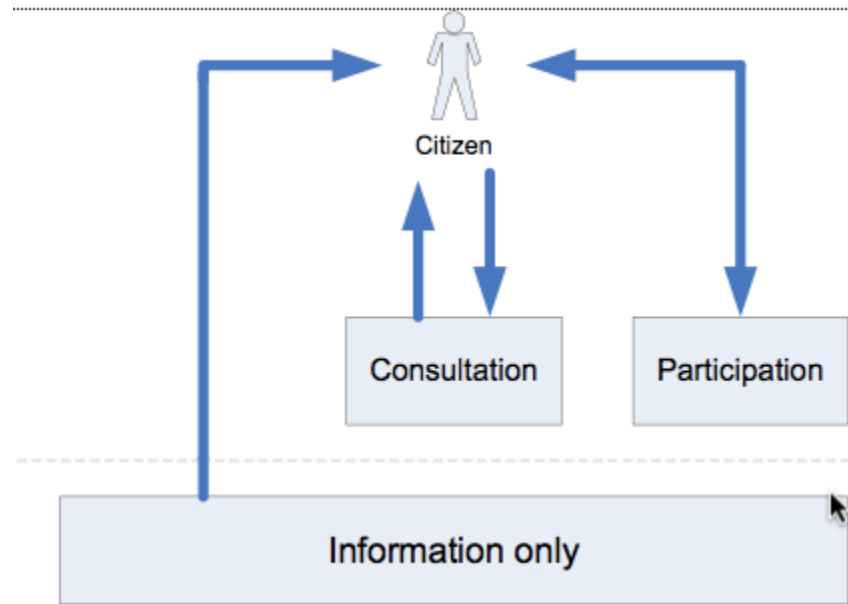
# The Role of Citizens

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Citizens can have different roles in the smart city:

- **Political processes and decision-making**
- Experts (sharing insight)
- Volunteers (sharing time)

# OECD Model



OECD, Engaging Citizens in Policy-making, in OECD Public Management Policy Brief. 2001, OECD: Paris, France.

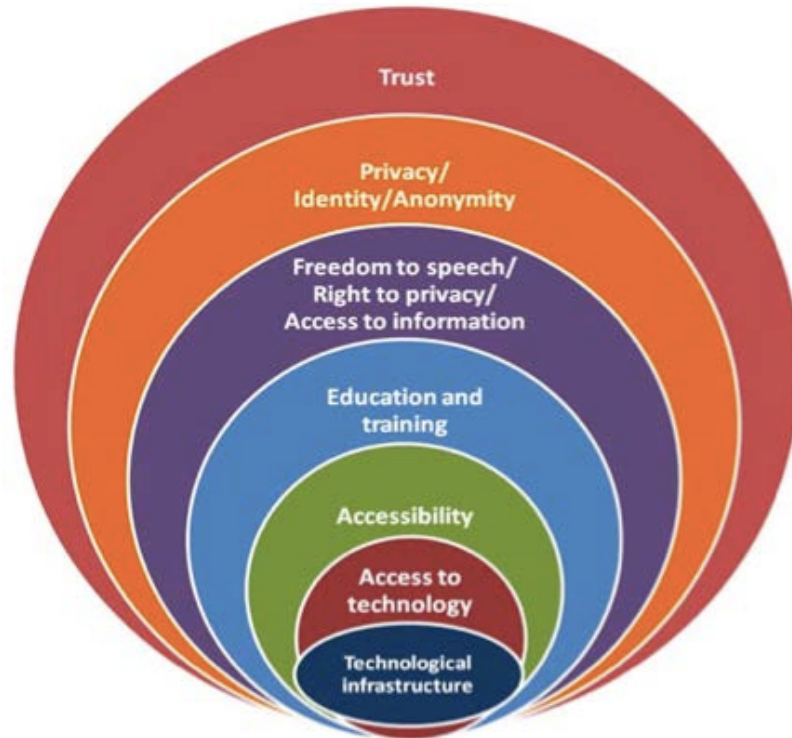
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# Political participation

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- In order to take active part in policy-making and political processes, the citizens need access to information
- *The transparent smart city*

# Preconditions for participation



This model was presented at ICDS 2010  
Berntzen, L. & Karamagioli, E.  
Regulatory Measures to Support eDemocracy  
IEEE Computer Society

*Preconditions for user  
participation and involvement*

# Transparency

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- Documents
- Meetings
- Processes
- Benchmarking
- Decision-makers and their agendas
- Disclosure



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# Documents

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- Access to documents used in the political decision making processes
- Mail records

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# Meetings

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- Agendas
- Proceedings (webcasts)
- Minutes

# Meetings

## Møteplan 2. kvartal 2016

Du ser her en liste over alle møtene det er sendt ut innkalling til, ordnet etter utvalg og ukenummer. Dersom du klikker på et ukenummer, får du en liste over alle møtene den uken, og ved å klikke på et møte får du mer informasjon om det.

Utvalg	14	15	16	17	18	19	20	21	22	23	24	25	26
<a href="#">Administrasjonsutvalget</a>								X					
<a href="#">Eldrerådet</a>			X					X					
<a href="#">Formannskapet</a>			X					X					
<a href="#">Hovedutvalg for drift, eiendom og næring</a>			X					X			X		
<a href="#">Hovedutvalg for helse, oppvekst og velferd</a>			X					X					
<a href="#">Klagenemnd</a>								X					
<a href="#">Klagenemnd eiendomsskatt</a>													
<a href="#">Kommuneplanutvalget</a>			X										
<a href="#">Kommunestyret</a>					X							X	
<a href="#">Kontrollutvalget</a>		X											
<a href="#">Legatstyret</a>			X					X					
<a href="#">Råd for mennesker med nedsatt funksjonsevne</a>			X					X					
<a href="#">Sakkyndig nemnd eiendomsskatt</a>		X	X										
<a href="#">Valgstyret</a>													

Forrige kvartal | Neste kvartal


# Webcasting

**Direktesending** **Bystyret**

**Tittel:** Anskaffelse av robuste boliger for vanskeligstilte  
**Utvalg:** Bystyret  
**Sted:** Rådhuset 20.04.2016 - 18:30  
**Saksnr:** 045/16/16

Bystyret 20.04.2016

- Rapportering lavterskel kafé rusavhengige, boligsosial..
- Mottatt innsigelse til område D12 Barkåker syd i komm..
- Kommuneplanens arealdel 2014-2026 - PlanID 0704 99007 ..
- Mindre justering av kommunegrensen mellom Stokke og Tø..
- Godkjenning av møtebok
- Referatsaker
- Kommunedelplan for dobbeltspor Nykirke - Barkåker, Pla..
- Interkommunal kommunedelplan for gange, sykkel og koll..
- Detaljregulering av Åsgårdstrandsveien 402. PlanID 070..
- Anskaffelse av robuste boliger for vanskeligstilte
- Avskrivning av tap på fordring - konkurso Conradas AS
- Tønsberg kontrollutvalg - årsrapport 2015
- Plan for forvaltningsrevisjon 2016 - 2019.
- Nordbyen Nedre. Innføring av boligsoneparkering.
- Godkjenning av etablering av Klokkeråsen barnehage
- Handlingsplan vold i nære relasjoner - over 18 år
- Kommunereformen. Status og vurderinger fra Tønsberg ko..
- Revisjon for...



172:15 192:58

Kameravalg Salen **Multikameravisning**

**Vedlegg:**  
Ingen vedlegg

Send på epost DEL

Løsningen levert av: **Aventia AS**  
2016 v3.0.17

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# Processes

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- It is important for citizens to understand the processes leading to the decisions
- Processes may be visualized as a flowchart
- Timeline

# Digital Planning Dialog

The screenshot displays the 'Tønsberg kommune' digital planning dialog interface. The browser address bar shows 'kart.tonsberg.kommune.no/webinnsyn/Content/Main.asp?layout=tønsberg&T'. The interface features a map of Tønsberg with various colored planning zones (yellow, green, purple, red, orange). A sidebar on the left lists 'Saksdokumenter' (Planning Documents) under 'Offentlig journal' (Public Journal), including items like 'Planoppstart', 'Uttalelse til planoppstart', 'Planutarbeidelse / Saksfremlegg', 'Saksfremlegg', 'Offentlig ettersyn', 'Saksforberedelser', 'Høringsuttalelse', and 'Annet'. Below the map is a timeline table showing the process from 2010 to 2013.

1.2.2010	19.2.2010	19.3.2010	3.10.2012	12.10.2012	25.1.2013	2. gangs behandling / Planvedtak	Behandling avsluttet
Planoppstart	Uttalelse til planoppstart	Planutarbeidelse / Saksfremlegg	Saksfremlegg	Offentlig ettersyn	Saksforberedelser	Kunngjøring / Klageadgang	

<http://nett.v.regjeringen.no/digitalt-planregister-og-plandialog>

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# Benchmarking

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- The possibility to compare how the city is doing compared to other cities.
- Indicators

# KOSTRA

## Grunnskoleopplæring - KOSTRA

### Lag egne tabeller og figurer

1 Velg tabell som inneholder de variablene du ønsker → 2 Velg verdier fra ulike variabler → 3 Se din skreddersydde tabell, eksporter eller lagre

Tabell: 04684: D. Grunnskoleopplæring - nivå 3 (K)

[Logg inn](#)

	2010	2011	2012
<b>0701 Horten</b>			
Netto driftsutgifter til grunnskolesektor (202, 214, 215, 222, 223)	236 984	243 098	277 328
<b>0702 Holmestrand</b>			
Netto driftsutgifter til grunnskolesektor (202, 214, 215, 222, 223)	96 574	105 422	104 880
<b>0704 Tønsberg</b>			
Netto driftsutgifter til grunnskolesektor (202, 214, 215, 222, 223)	387 122	409 789	420 104
<b>0706 Sandefjord</b>			
Netto driftsutgifter til grunnskolesektor (202, 214, 215, 222, 223)	473 984	475 373	503 471
<b>0709 Larvik</b>			
Netto driftsutgifter til grunnskolesektor (202, 214, 215, 222, 223)	428 291	427 949	437 900

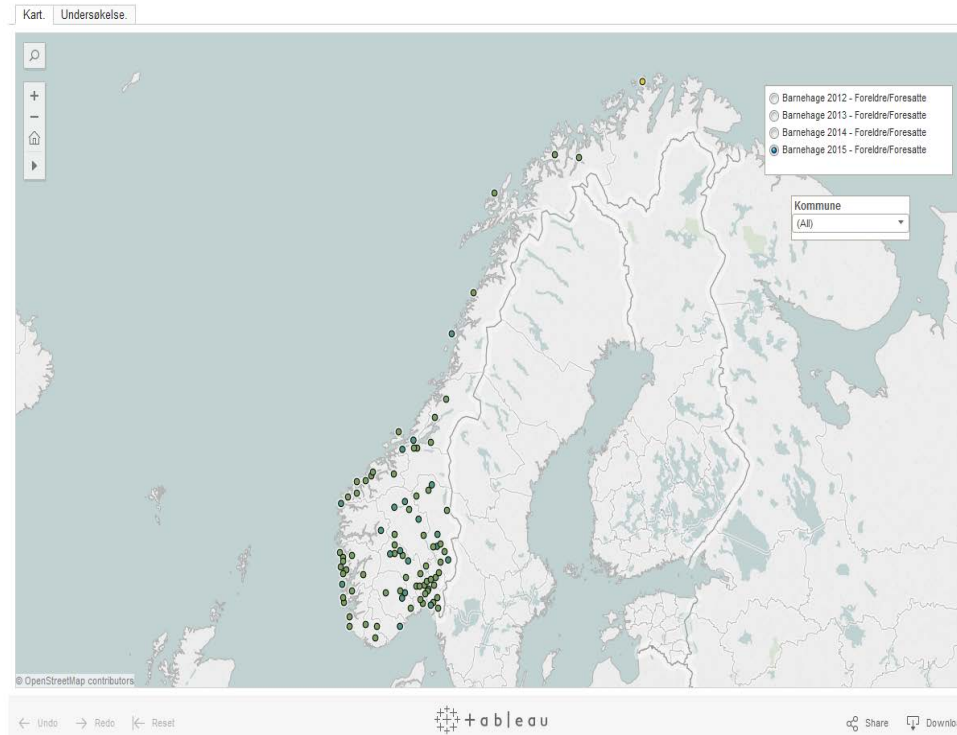
**Fotnote(r):**  
En generell kompensasjonsordning for merverdiavgift innført fra 1.1.2004 kan føre til brudd i tidsserien fra 2003 til 2004 i ulike regnskapsbegreper. Ordningen vil kunne innebære reduksjon i netto driftsutgifter totalt, netto driftsutgifter på funksjon/tjenesteområde, korrigerte brutto driftsutgifter totalt, korrigerte brutto driftsutgifter på funksjon/tjenesteområde og brutto driftsutgifter på funksjon/tjenesteområde eller økning i brutto driftsinntekter på funksjon/tjenesteområde. For nærmere forklaring henvises til Faglig veiledning kapitlene 2B - 2E.

Funksjon 383 for musikk- og kulturskoler er flyttet fra tjenester for grunnskole til tjenester for kultur f.o.m 2001

[Vis i eget vindu](#) [Skriv ut](#)



# BedreKommune.no



# Decision makers

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- The personal interests of decision makers should be known to the citizens



# Register of interests

## STYREVERVREGISTERET

|Skriv ut | Sidekart

SØK SØKETIPS FORMÅL OM REGISTERET SUPPORT REGISTRERING PRESSE KONTAKT OSS

Du er her: torsdag, 16. apr. 2013

### Søk

Her kan du gjennom søk i kommune, fylkeskommune eller kommunalt eid selskap søke på personer i kommunal sektor og se deres ulike roller som blant annet folkevalgt, ansatt, styreleder, styremedlem, oppdragstaker og innehaber av andre næringsinteresser.

Styrevervregisteret er et verktøy som KS tilbyr kommuner, fylkeskommuner og kommunalt eide selskaper å ta i bruk. Det er frivillig om den enkelte kommune, fylkeskommune eller kommunalt eide selskap vil knytte seg til Styrevervregisteret, og om man vil benytte seg av alle mulighetene registeret gir. Det er videre også frivillig om den enkelte personen i kommunen, fylkeskommunen eller kommunalt eid selskap ønsker å la verv og økonomiske interesser om seg selv bli registrert. Styrevervregisteret vil derfor ikke gi en fullt ut dekkende oversikt over alle verv og økonomiske interesser personer i kommunal sektor har.

Navn: Kjendlie, Karen Anne

**Kontakt oss:**  
[styrevervregisteret@ks.no](mailto:styrevervregisteret@ks.no)

**Registrerte politiske verv, ansettelsesforhold samt andre verv og interesser:**

TYPE INTERESSE	BESKRIVELSE
Folkevalgt, fast	VESTFOLD FYLKESKOMMUNE, Høyre
Utvalg	Medlem, Hovedutvalg for utdanning, VESTFOLD FYLKESKOMMUNE, Høyre
Utvalg	Medlem, Fylkesutvalg, VESTFOLD FYLKESKOMMUNE, Høyre
Utvalg	Medlem, Fylkestinget, VESTFOLD FYLKESKOMMUNE, Høyre
Folkevalgt, fast	Tønsberg kommune, Høyre
Styremedlem	Psykatrien i Vestfold HF, far godtgjørelse. Nestleder i styret
Styremedlem	Sykehuset i Vestfold HF, far godtgjørelse.
Styremedlem	Oslofjordfondet RFF, far godtgjørelse. Regionalt forskningsfond
Styreleder	Gea Norvegica Geopark IKS, far godtgjørelse.

Ingen ytterligere verv/interesser registrert.

© Styrevervregisteret Informasjon om informasjonskapsler.

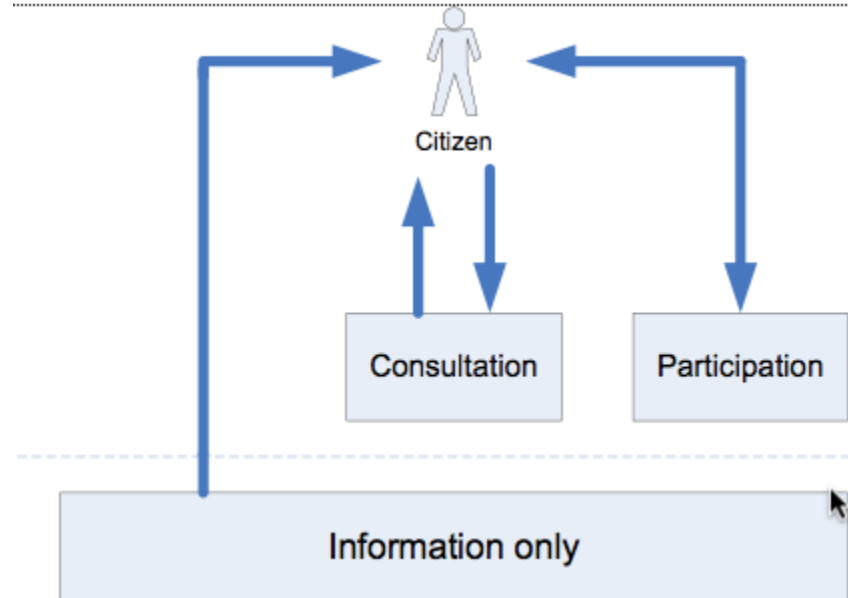
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# Disclosure

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- Citizens should be able to ask for information regarding the running of the city.

# OECD Model



# Consultations

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- The city asks for input on specific issues, and provides a service for collecting input from its citizens
- Some kind of feedback should be provided on how the input has been used
- If input is not valued, interest will disappear

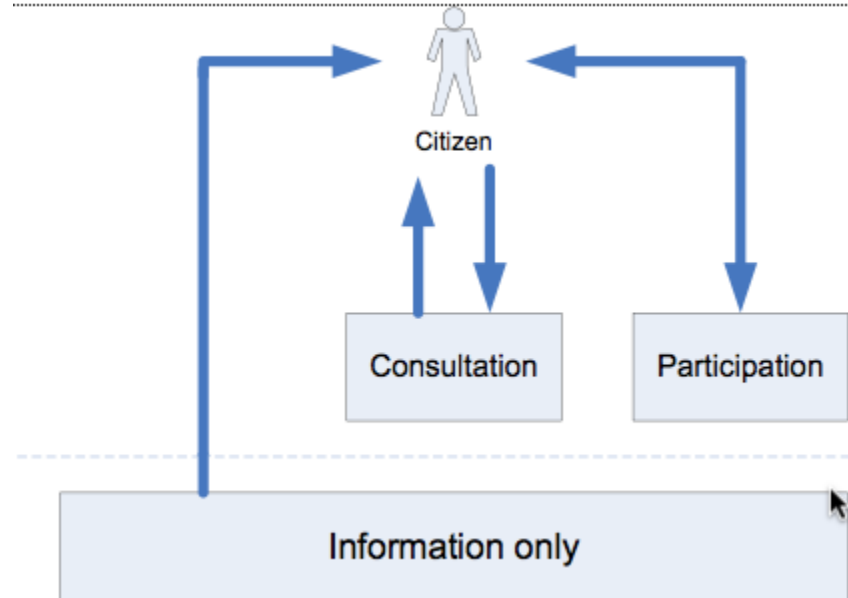
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# Polling

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- Citizens are asked about specific issues, but the responses are normally limited to yes/no or values on a scale.

# OECD Model





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# Participation

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- Consultations are top-down. The city asks its citizens for input on specific issues
- Participation is different. The citizens may raise issues they are concerned about
- The goal is to have a dialog between the city and its citizens.

# Discussion Forums

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- Several Norwegian municipalities established discussion forums to collect input and start dialog with their citizens.
- Unfortunately, they have been closed down, one after another due to abuse.
- Racial discrimination, attacks on city employees.

# Citizen initiative

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- Between elections, citizens can raise issues by making a “citizen initiative”.
- The citizen initiative is embedded in the legislation. If the initiator manages to collect signatures from 2% of the population or 300 signatures, the local council is obligated to discuss the initiative.
- No positive response is guaranteed.

# MinSak.no (MyCase)

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- The government has established a platform “minsak.no” to facilitate both proposals and collection of signatures
- The platform has so far 685 registered initiatives

# MinSak.no

The screenshot shows the MinSak.no website interface. At the top, there is a navigation bar with a 'Logg inn' button, language options (Bokmål, Nynorsk, A+ A-), and a search bar with a 'Søk' button. Below this is a main header area with a purple 'minsak.no' logo and a three-step process: 1. 'Beskriv din sak' (Describe your case), 2. 'Samle underskrifter' (Collect signatures), and 3. 'Få saken vurdert i kommunestyret/fylkestinget' (Get the case evaluated by the municipal council/county assembly). The main content area is titled 'Kom med din sak!' (Join your case!) and contains text explaining the process: 'Her inne kan du foreslå saker du mener vil gjøre din kommune eller fylkeskommune bedre.' (Here you can propose cases you think will improve your municipality or county.) It also mentions that users can share the case on social media and that 300 or 500 signatures are needed for evaluation. A sidebar on the left contains a menu with 'Hjem', 'Foreslå en sak', 'Retningslinjer', and 'Se saker'. On the right, there is a section 'Se saker fra ditt hjemsted' (View cases from your home area) with a search bar and a 'Velg' button. At the bottom, there is a purple banner for 'Aktuelle saker' (Current cases) and a row of four colored boxes representing different categories.

# Social Media

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- Many municipalities (184) have established themselves in social media (Facebook)
- These pages are mostly used for questions and answers, but there is some examples of dialog taking place
- Citizens have to use their Facebook profile, which disciplines the discussions

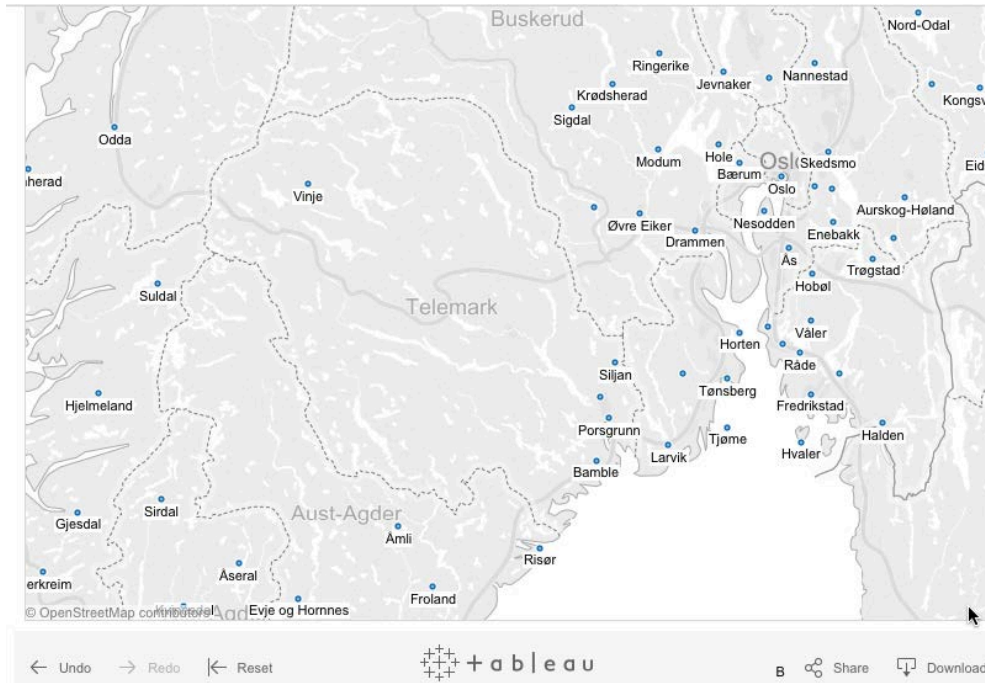
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# Social Media

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- Two of my students made a solution to track the use of municipal Facebook pages
- Show comments, reactions and shares

# Social Media



[http://socialmediadata.citizencentric.net/maps\\_tableau.html](http://socialmediadata.citizencentric.net/maps_tableau.html)



# Participatory Budgeting

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- Participatory budgeting has become widespread, where the citizens vote on the use of (a portion) of the total budget for a city. In this case, the results are a 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

# Political Participation

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- Political participation is seen as important by many researchers
- A shift towards direct democracy
- Or support for indirect democracy?
- What is successful participation?
  - Quantity?
  - Impact?

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# Political Participation

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- In my opinion, the “smart city” should listen to its citizens, since they sometimes have concerns that should be taken into account
- At the same time, we have to be realistic. Not all citizens have opinions on everything
- In their book “Stealth Democracy”, Hibbing and Theiss-Morse from USA support this

# “Stealth Democracy”

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- *“The last thing people want is to be involved in more decision making: They do not want to make political decisions themselves; they do not want to provide much input to those who are assigned to to make these decisions; and they would rather not know all the details of the decision-making process.”*
- Hibbing and Theiss-Morse build on empirical data from U.S.A.

# The Role of Citizens

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Citizens can have different roles in the smart city:

- Political processes and decision-making
- Experts (sharing insight)
- Volunteers (sharing time)

*Non-political participation*

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# Mobilization

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- The smart city may use information technology to mobilize citizens to help making the city a better place to live
- I will now show a couple of practical examples on how this can be done

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# Human sensors

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- A “human sensor” is a person that observes some issue and reports it using some platform.
- Smart phones

# Green Watch Project

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- 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



# FixMyStreet

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- FixMyStreet 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

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- 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

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- 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 Norway, the application has been translated into „FiksGataMi“
- In this case the citizens are acting as „human sensors“. They observe something is wrong and report it

# FixMyStreet


## FiksGataMi

Rapporter et problem Dine oppdateringer Alle rapporter Lokale varsler Hjelp FORENINGEN NUUG

### Manglende skilting ved kryssing av gangvei øvers i Torsrudveien

Rapportert i kategorien Trafikkskiltet anonymt 16:00, mandag  
Sendt til [Røyken](#) og [Statens vegvesen region sør](#) 5 minutter senere

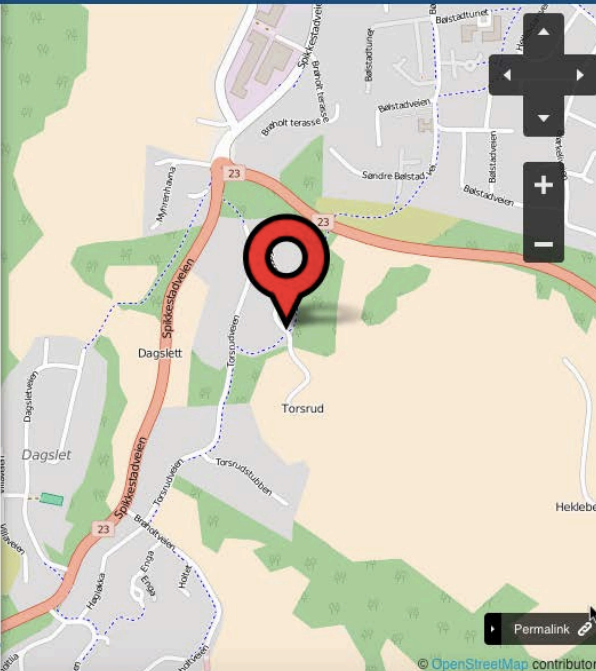
Det er ingen skilt i Torsrudveien for billister som krysser den. Bilveien går rett over gangveien, og det er fare for syklende og gående, særlig skolebarn. Fartsdumpen er kun på den ene siden og for langt unna, slik at bilene gir gass etter den og over gangveien.



Det er mye biltrafikk over dette gangvekrysset og farten er ofte høy.

Her trengs det tydelige skilt som forteller at man krysser en

Rapporter misbruk Få oppdateringer Problemer i nærheten



© OpenStreetMap contributors

# Sauberes Wiesbaden

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- The project aims to promote the participation of the citizens to quickly and easily report illegal garbage in the area of Wiesbaden, Germany
- An app has been developed to make reporting easy. The app uses the location data from the mobile phone to give exact position of the problem

# SafetyNet

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- SafetyNet is a self-help network. The initial idea was to provide self-help to spouses of patients suffering strokes or dementia
- The platform is run by a consortium of municipalities, and have later been extended to support parents of children with psychological problems, and relatives of drug abusers

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# SafetyNet

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- 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

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# SafetyNet

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- The network is run by coordinators employed by the municipalities, and these coordinators also arranges off-line events

<http://www.trygghetsnett.no/safetynet/safetynet-article755-599.html>



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# Conclusion (not the final)

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- Participation is more than **political** participation
- Researchers have been too concerned with political engagement
- But participation is more than politics, it can be used to build better services and achieve better quality of life for the citizens

***Size doesn't matter  
Small cities can be smart too***

# Key question

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- Does a city need to be large to be smart?
- Of course not!
- Most issues are also relevant for smaller cities.

# Smaller Smart Cities

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- I will try to answer the question by some questions:
  - Will a small city benefit from citizen participation?
  - Does a small city have parking problems?
  - Is environment and climate only an issue in large cities?
  - Is quality of life important in small cities?

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# Size doesn't matter

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- Most issues are just as important for citizens in small cities
- In literature it seems that large cities are dominant in smart city projects and research papers
- Smart city research is relevant also for smaller cities

# Holmestrand, Norway

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I will now present how my own (small) city have become smarter regarding efficiency, quality of life, and sustainability

**Holmestrand** is located in Vestfold, approximately 80 kilometers south of Oslo (the capital)

- Population approx. 10.500
- Urban planning to build more dense around public transport stops
- Two level city: New elevator to provide access to railway station
- Upgrade of harbor area to increase attractiveness and quality of life

# Holmestrand, Norway

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- Plan to reduce environmental footprint
- Home care uses electric cars
- Free charging stations
- Buses and garbage trucks run on biofuel (county)
- Intelligent street lights (county)
- Nursing home heated by ground-coupled heat-exchange
- Positioning technology on snow removal trucks
- GPS Tracking of buses (county)

# Holmestrand, Norway

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- Adoption of assistive technology to help citizens live in their own homes despite medical conditions
- Safety alarms
- Fall alarms
- Walk-in bath tubs
- Spoons with gyroscope
- Medicine dispensers



# Holmestrand, Norway

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- All policy proposals to city council includes section on environmental consequences
- Upgraded electronic services
- Transparency – webcasts
- Digital services - maps

# ***Monitoring Air Quality IoT in the Smart City***

# Introduction

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- One of the key areas of smart cities is environment.
- Environmental monitoring provides current conditions and can be used to find trends
- The results can be used for decision making.

# The Context

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- Every winter, Oslo and Bergen, the capital and the second largest city of Norway, have severe problems with air quality.
- The air quality problems are caused by certain climatic conditions that put a lid on top of the cities.

# Measures

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- Bergen use the last digit on the number plate to decide what day you are allowed to drive in the city.
- Oslo is considering different approaches, like raising the toll fees or restricting the types of cars allowed to drive in the city.
- On Tuesday, January 17th, cars using diesel were not allowed to drive in Oslo. The ban was lifted in the evening the same day.

# How are decisions made?

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- Each city has a limited number of stationary measurement units. Oslo has seven units.
- Pollution may vary with location
- Low granularity gives inaccurate readings
- Decisions may not reflect the real situation

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# Citi-Sense

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- European Union – funded project
- Made mobile hand-held units
- Need people to carry them around

# Our Goals

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The ultimate goal is better decision making through improved analysis and data collection.

- More units provides better granularity
- Mobile units make it possible to measure at more locations
- Inexpensive units make data collection feasible



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# Our approach

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- Mobile unit
- Installed in cars
- Starts collecting information when car is parked
- Transmits information to central server.

# Project Organization

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- This project is done in collaboration between Faculty of Engineering, “Lucian Blaga” University of Sibiu”, Romania and University College of Southeast Norway.
- Three students built the first prototype during their mobility stay in Norway (Two from Sibiu, one from Craiova).
- EEA grant

# First Prototype

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- The first prototype used Intel Edison as processing unit
- Communication was handled through Bluetooth connection to a mobile phone
- GPS unit provided location information
- Sensors for barometric pressure, temperature, humidity, sound, and CO<sub>2</sub>,

# Lessons Learnt – First Prototype

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- Use of Android phone for communication requires a phone with a subscription. App need to be installed. Not good for larger deployments.
- Sound sensor had limited use
- Intel Edison is a quite expensive processing unit

# Second Prototype

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- Based on LinkIt Duo, a cheap dual processing unit.
- Combined GPS and GSM unit
- No sound sensor
- Added a particle sensor
- Replaced CO<sub>2</sub> sensor with sensor able to also measure NO<sub>x</sub>

# Second Prototype

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- 16 environmental platform sensors has been made in Sibiu.
- First test in Sibiu, February 2017
- Collaboration with Romanian National Environmental Agency and CitizenAlert (NGO)
- Planning larger project with more than 100 units.
- Unit cost: Around Euro 120,-

# *A Citizen-Centric Public Sector*

# Citizen Centricity

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- What is citizen centricity?
- Products, services and processes seen as
  - Efficient
  - Affordable
  - User-friendly
- The public sector is there to serve its citizens, but is the public sector citizen-centric?



# Norwegian Flirt trains



- 2012: 23 new train sets were put into service
- Massive complaints from users about the seats
- Seats were changed for a price of 5 million Euro (finished in 2014)

# Driving license



- Physical document to show you can drive
- If you can not show the driving license, you will get fined by the police
- The information is checked online to find out if the license is valid.

# Parking ticket machine



- Insert credit card
  - Select parking time
  - Get parking permit
  - Remove the credit card
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- What are most people focusing on?

# Why is this happening?

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Based on organizational theory:

- Decisions are made and carried out to provide legitimacy for decision makers rather than effective solutions for benefiting the citizens
- Decision makers tend to make decisions based solely on organizational culture focusing on internal needs and professional technical service standards, without paying attention to external (citizens) needs
- Cultural frame: *“The way we have always done things around here”*

# Organizational identity

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- Organizational identity is constructed through four processes of **mirroring** (in the mirror of others), **reflecting** (culture, embedded in history and traditions, meanings and understandings), **expressing** (the way culture is being expressed) and **impressing** (leave impression on others)
- Accordingly, organizational identity consists of the two concepts of image and culture.
- Culture represents the past, the roots, and thus the core identity.

# Transformation

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- Transforming an organization requires cultural change through behaviors, values and basic assumptions
- Therefore, cultural change is crucial in order to develop a a citizen-centric public sector
- Identity needs to be reconstructed

# The impact of culture

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- It seems that public organizations give great attention to different activities and projects which are nearly exclusively connected to the past and existing culture
- This is done without having taken into account how a citizen-centric organization ought to be organized in order to fulfill the increasing expectations from the citizens
- On the other hand, the cases expose the opposite tendency of uncritical focus on legitimacy and image without necessarily connect the projects through involvement and engagement with the existing culture

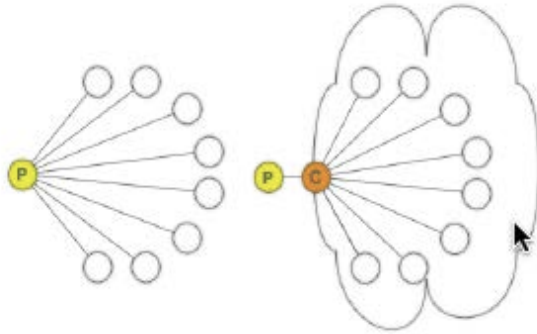
# Image vs. culture

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- As shown in the cases, the efforts of citizen centricity might also fail due to overemphasizing on external stakeholder images and legitimacy.
- Thus, the organizations are occupied with gaining legitimacy, making an impression of being a citizen-centric public organization without necessarily emphasizing effectiveness, the needs and the expectations of the citizens.



# Cancer treatment coordinators



- Hospitals and municipalities have established designated cancer treatment coordinators
- Fastest possible assessment and treatment for patients
- The coordinator hides the complexity of the public sector

# User-controlled personal assistant

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- Health and Rights Act of 2015 established user-controlled personal assistance as a right
- Example: “Lisa” is offered a walk in the park in the middle of the day, but what she really wants is to be with friends in a café on Friday evening.
- The user-managed personal assistant is the citizen-centric answer to such problems. The patient is given a certain number of hours a week, but the patient is in charge of how and when the hours are used.
- This empowers the patient.

# ICT

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- Most services provided by government on different levels are depending on human resources. Teachers teach our children, healthcare personnel take care of those with medical problems, and manual work is needed to maintain roads.
- But, ICT plays an increasing role in the service provision. The teachers are using ICT to communicate with parents, those with medical problems may book consultations online. Prescriptions are sent from the general practitioner (GP) to the pharmacy through electronic communication. Drivers may get updated information on road construction work through the Internet.
- Therefore, it is fair to say that electronic services play an important role in public service provision.

# Digital Agenda Norway

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- In April 2016, the Norwegian government issued a white paper “Digital Agenda for Norway – ICT for a simpler everyday”.
- One of the two key objectives is a citizen-centric and effective public sector. Ambitions are high.
- The users (citizens, public and private entities and the voluntary sector), and their needs shall be the central starting point.
- Public services shall be seen as coordinated and complete, independent of which public sector entities are providing the services.
- The public sector should reuse information instead of asking users for information already acquired.

# Digital Agenda Norway

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- The government wants (among other things):
  - Real user participation to ensure that users views and needs is taken care of in development of digital services.
  - Stimulate more trials by using service design to contribute to more good user centric services.

# Suggestions to improve citizen centricity

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- Build organizational identity
- Involve the citizens
- Share data
- Reuse data
- Collaborate on web site structure and content
- Spend less time on web site structure
- Improve readability
- Protect privacy

# *Conclusion*

# Conclusion (final)

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- Smart cities is about quality-of-life, efficiency, participation and sustainability
- Public service delivery can be automated or supported by technology
- Citizens can participate in city politics, but may also play an important role as non-political participants (e.g., human sensors and volunteers)
- Information is important, and can be made more available and accessible through use of information and communication technology
- Internet-of-things will help monitoring the city and help decision making (as shown in the air quality monitoring study)



# Conclusion (final)

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- Citizen centricity is not obvious
- We need to progress from “political speeches” to changing the culture of public sector organizations.
- Some recent legislation within the health sector shows the political willingness to improve citizen centricity.
- Digital Agenda for Norway is a step in the right direction regarding electronic service provision.
- Future work: In-depth case studies to show how identity and culture impacts on citizen-centric behavior

# Thank you for listening

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