

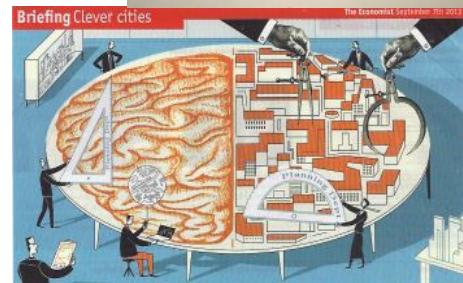
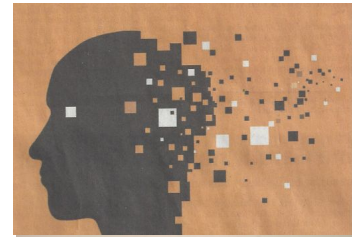
The Smart City Challenge

Challenges and Pathways of Urban Development in the Evolving Digital World

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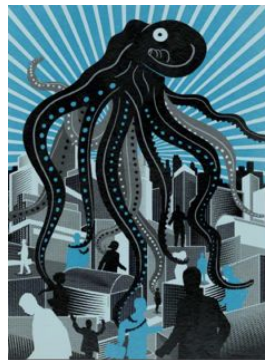
Outline

1. The evolving digital world
2. Enticements of smart technologies
3. Smart city as a catalyst
4. Challenges and concerns
5. The darker sides of smart city development
6. The drivers of the smart city
7. Pathways into the future of urban development
8. A final comment



Smart Cities

Narrative



1. Smart technologies are conquering every day life in cities and regions
2. The application of smart technologies has become a multi-billion business driven by a few large global corporations
3. The smart city paradigm has evolved as a new city development concept.
4. The convenience of using smart technologies is dominating the discourse
5. Challenges and concerns, such as privacy and risk are pushed aside
6. Implications for urban development are under-researched

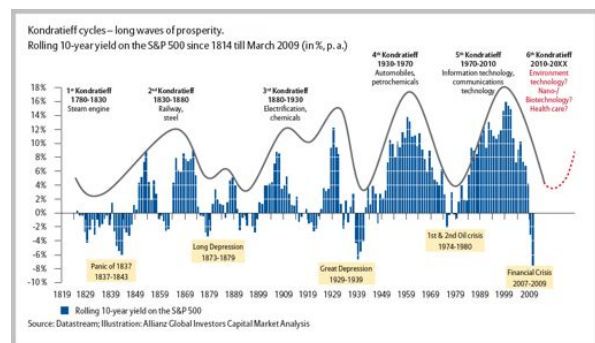
Background: Digitalization



New digital/intelligent/smart technologies
 > the internet of things, big data
 are changing economy and society, locally and globally.

They drive the **Fourth industrial Revolution** and promote the information and knowledge society in an enormous speed; they

- Change production styles > **industry 4.0** and influence locational choice
- Revolutionize mobility > e-mobility, driverless cars
- Saving energy, water and protect the environment in times of climate change
- Transform learning and higher education > e-learning
- Improve health care > e-medicine
- Modify social communication
- Improve governance > e-governance
- Make agriculture more efficient

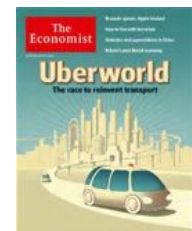


From Coal to Big Data

In the past: Coal, ore, gold, marble, silver, diamonds, marble ...

Today: Data on mobility, consumption and values

- When we do what
- Where we drive and when and how
- Where and what and when we eat and shop
- Where we spend holidays
- Which movies we watch, which music we like
- Which means of transport we use
- Which hotel we book
- How we pay



The data are collected, stored and analyzed by a few global corporations

The sell it then to market research institutions and marketing agencies

- Travel industries
- Fashion industries
- Media and publishers

...also to police and others, who are willing to pay for it

> **Should local governments sell the data, they collect?**

Smart City as a Catalyst



Driven by the convenience of consumers, the curiosity of engineers, the requirements of the environment and last not least by the power of global corporations digitalization will gradually change the functional structure of cities.....

Not surprisingly the **smart city** has become an attractive urban development paradigm for architects, planners, engineers, urban marketing professionals, journalists and mayors! They jump on the smart city paradigm with much rhetoric; they improvise, react to the technological innovations and adapt the introduction of digital technologies to existing conditions as much as possible and feasible.

Cities and urban planners are not prepared to cope with the manifold economic, social and cultural implications of the evolving digital world on cities and citizens, as well as on the local economy

Smart Cities

The dimensions of smart technologies

The application of smart technologies is driven by large corporations, governments, cities and users in ten or eleven fields

- Smart communication and participation
- Smart production (industry 4.0)
- Smart mobility and logistics
- Smart energy and water management
- Smart safety and security
- Smart housing

- e-shopping
- e-government > smart governance
- e-care and e-medicine
- e-learning
- e-agriculture



... there are many other ways of categorizing the application of smart technologies in urban development

THE WHOLE IS GREATER THAN THE SUM OF THE PARTS

An ideal smart city strategy covers six interrelated action fields, comprising a host of subcategories and solutions

Think:Act

navigating complexity



GOVERNMENT

- Digital public administration
- Participatory governance
- E-services

BUILDINGS

- Connected facility management
- Smart home
- Smart construction

HEALTH

- Telemedicine
- Integrated health information systems
- Ambient assisted living

MOBILITY

- Intelligent traffic management systems
- Smart services for public transport
- Smart urban logistics

EDUCATION

- Urban education platforms
- Digital learning formats
- Digital skills

ENERGY AND ENVIRONMENT

- Smart energy
- Smart water management
- Smart waste management

Challenges and Pathways of Urban Development in the Evolving Digital World

Enticements

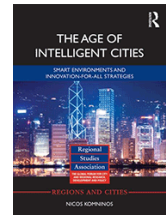
Digitalized services to citizens, enterprises, local governments institutions and businesses



- Create better and faster access to any kind of information **any time and everywhere, locally and globally**
 - Improve individual mobility and orientation in cities and regions
 - Make consumers independent from opening times and locations (**e-shopping**)
 - Raise personal security at home and safety on the road
 - **Increase** productivity in production (**industry 4.0**)
 - Save energy and water by numerous systems of controlling energy consumption
 - Improve access to public services and facilitate public management
 - Make it easier for tourists and visitors to enjoy cities and city life
 - Assist elderly and physically handicapped to get personal medical support
 - Facilitate education and life-long education and training (**e-learning**)
 - Help singles to find a partner for a coffee, day, a night, or even a whole life.....
- ... and many other enticements**

Though all this at the costs of privacy!

Why Smart Cities?

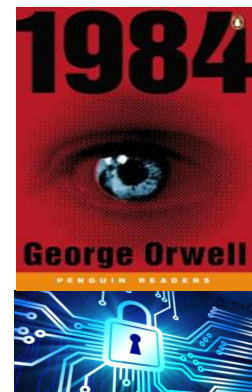


- The availability of new technologies > **I-phone** and the pressure upon enterprises and engineers to advance technological innovation
- The challenges of cities and regions to provide mobility, resource efficiency and affordable public services
- The hope of cities to remain globally competitive
- The strong believe that ICT technologies can make cities more sustainable and efficient >**The sustainable imperative: to save energy and water**
- The expectation of cities to find better ways and means cope with the growing complexity of local development challenges in times of göobalization
- The pressure of time in the new urban economy and the quest for instant access to information anytime and everywhere
- and not to forget the **fun** of using new ICT technologies

Challenges and Concerns



- Jobs
- Privacy
- Speed and Stress
- Risk
- Power and business interests



Jobs



New industrial production will gradually be taken over by intelligent robots

- Traditional workers will lose their jobs. They will be replaced by more educated staff operating factories and robots
- Structure of industries will gradually change from mere production to more integrated and flexible systems > **production, services, research**
- **Education and training will change to prepare for the new work environments**
- Location requirements of industrial enterprises will change with the qualification requirements of employees > **workers, engineers, researchers**
- The industrial labour force will decline and new jobs will be offered in other fields > **logistics, business services, social services, food, health, leisure, entertainment, tourism, though all these fields have their very spatial location requirements**

> **The traditional functional division of space in cities embedded in land use regulation does hardly meet the new requirements of the digital society!**

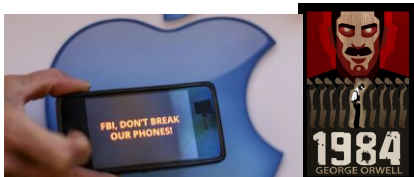
Privacy

Convenience vs privacy



Source: New York Times 2016.02.24

- Big data are in the hands of a few **corporations**. Their use (and misuse) is almost un-controllable.
- **Insurance companies** may use personal data for raising insurance fees.
> health insurance, automobile insurance...
- Under the pretext of fighting terrorism and insurgent movements **governments** may use big data for supervising individuals



“ We will have to fight for our privacy, or we will lose it! ”

Eric Schmidt/Google

The Citizen Lab

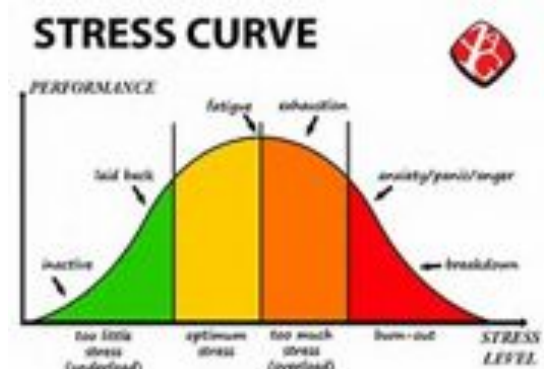
The Citizen Lab is an interdisciplinary laboratory based at the Munk School of Global Affairs, University of Toronto, focusing on research, development, and high-level strategic policy and legal engagement at the intersection of information and communication technologies, human rights, and global security.

Research is combining methods from political science, law, computer science, and area studies. It includes: investigating digital espionage against civil society, documenting Internet filtering and other technologies and practices that impact freedom of expression online, analyzing privacy, security, and information controls of popular applications, and examining transparency and accountability mechanisms relevant to the relationship between corporations and state agencies regarding personal data and other surveillance activities.



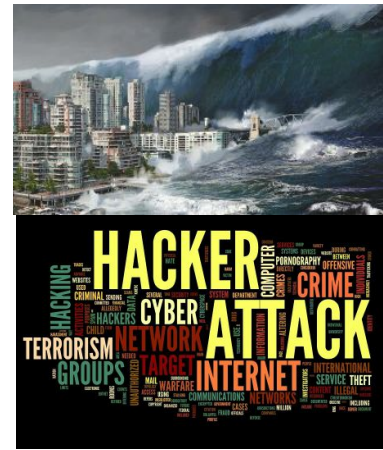
Speed and Stress

- Digitalization is speeding up work
- Lifestyles in city regions change
- Time has become a precious good and stress a challenge for many citizens
- Occasional burn-outs have become a common phenomenon
- More and more (single!) citizens require psychological advice or search for opportunities and places to relax > sabbatical, yoga, buddhism, monastery vacations



Risk

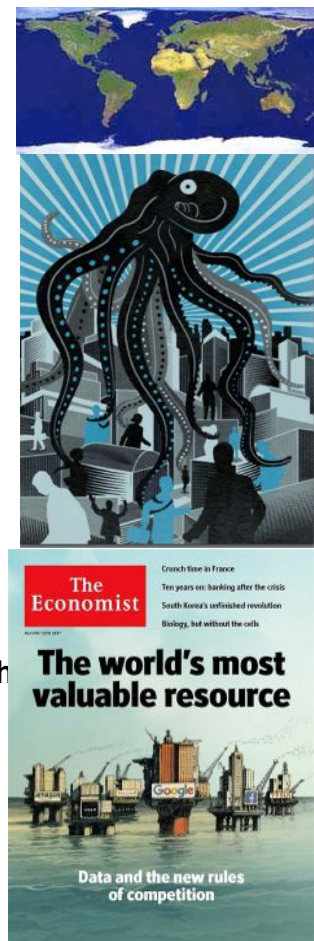
- Digital infrastructure and smart systems are hacked by external hackers
- The system breaks down due to technological or even individual failures, (natural or electronic) accidents or external attacks terrorism or cyber wars
 - > **Possible impacts:** Traffic chaos, water shortage, flooding, energy cuts.....
- in case the new smart system does not work as a rule, no safety net (plan B) is in place!



Power

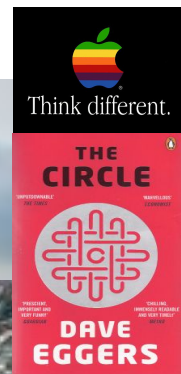
The power of

- Large globally acting corporations and policy advisors, which can less and less be controlled by local or even national governments, such as
 - > **Frost & Sullivan, Apple, IBM, Google, Siemens, Daimler, Hitachi, Alibaba Huawei, Samsung**
- Launched and supported by international organisations, such as
 - OECD, EU or even NGOs** and their interregional Information and communication power
- High ranked and globally praised universities and research centres, such as
 - > **MIT, Stanford University, Singapore University, ETH Zürich, Tsinghua University, who are driving the innovation and application of smart technologies.**

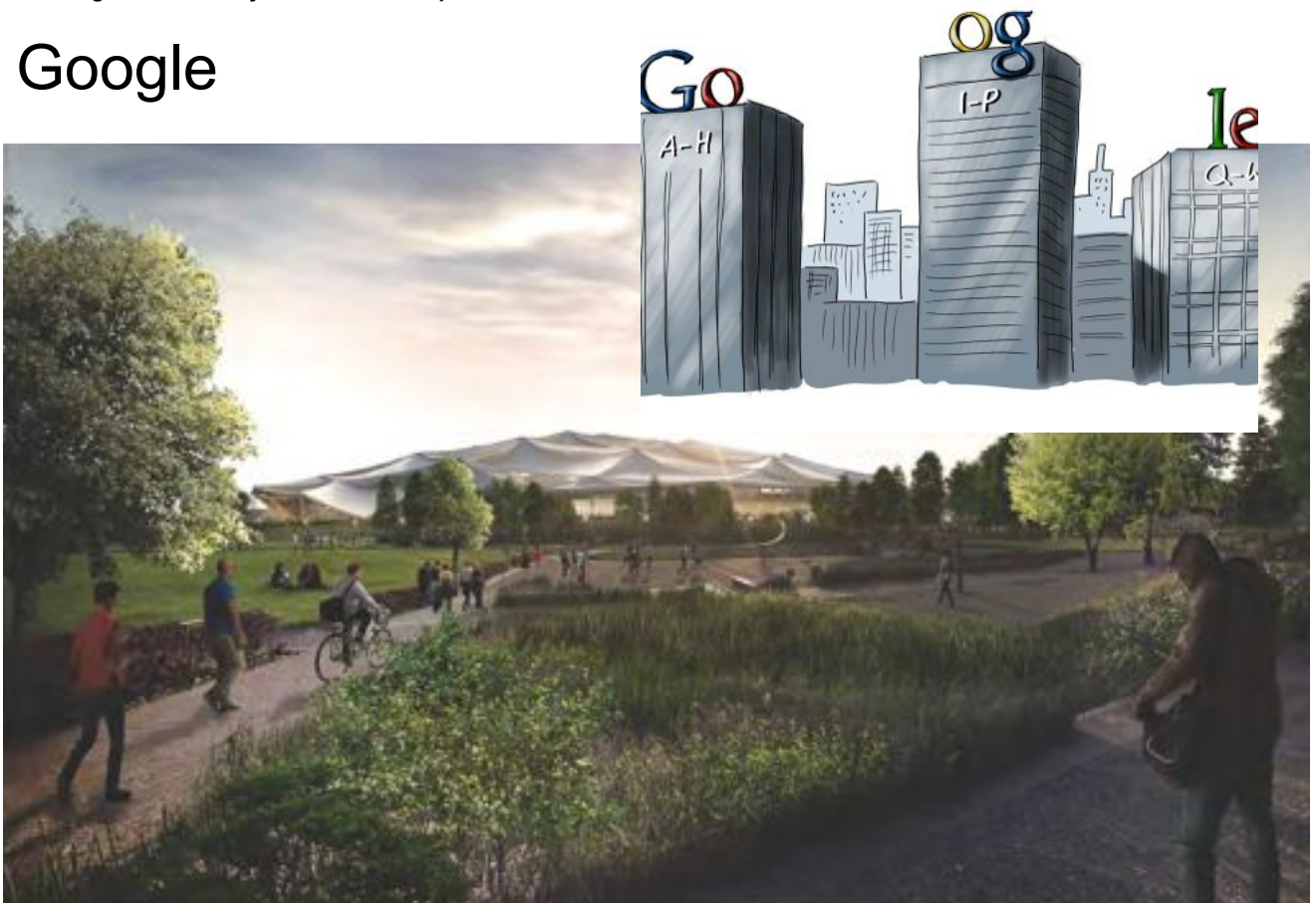


Apple

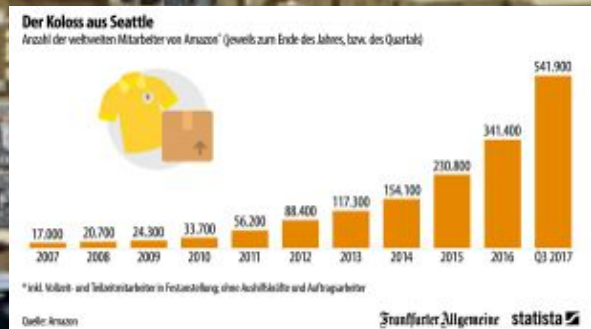
- 13.000 jobs in a spaceship in Cupertino/California
- 10.000 underground parking spots
- Campus: 700.000 m²
- Floor space: 260.000 m², 1,6 km outside extension
- Independent energy provision by renewable energy
- Extensive sports and leisure facilities
- Bigger than the Pentagon



Google



Amazon



Donald Trump 29- March 2018

:I have stated my concerns with Amazon long before the Election. Unlike others, they pay little or no taxes to state & local governments, use our Postal System as their Delivery Boy (causing tremendous loss to the U.S.), and are putting many thousands of retailers out of business!



Trump has talked about changing Amazon's tax treatment because he's worried about mom-and-pop retailers being put out of business.

“He's wondered aloud if there may be any way to go after Amazon with antitrust or competition law.

"Trump's deep-seated antipathy toward Amazon surfaces when discussing tax policy and antitrust cases. The president would love to clip CEO Jeff Bezos' wings. But he doesn't have a plan to make that happen.

Behind the president's thinking: Trump's wealthy friends tell him Amazon is destroying their businesses. His real estate buddies tell him — and he agrees — that Amazon is killing shopping malls and brick-and-mortar retailers.

Siemens

Offering smart technology solutions though recently changing its logo

SIEMENS

Ingenuity for life

Ingenuity stands for innovation, trust and the arts of engineering



Siemens

Abu Dhabi und Dubai will be two of the 17 locations of digital research centres where up to 900 software specialist will develop specialized applications, among others for airports, urban mobility, energy, logistics, food and medicine.

SIEMENS

Ingenuity for life

- **500 million investment until 2020.**
- > targeting Saudi Arabia, Egypt and the



Abu Dhabi

Frost & Sullivan

Using well designed images to impress decision-makers

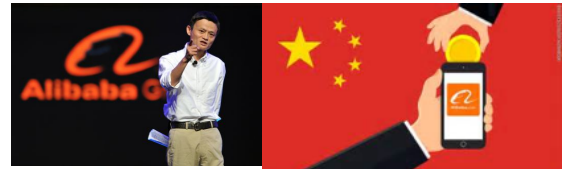


Hitachi



Alibaba

What Is Alibaba?
 It is a marketplace, a search engine and a bank, all in one.



Source: Alibaba, Manhattan Venture Partners



THE UBER APP

The Uber application operates in over 120 cities, across 35 countries, offering different products in each market.

 Singapore Paris London Jeddah Abu Dhabi San Francisco New York City Los Angeles Frankfurt Barcelona	 Dubai Hong Kong Abu Dhabi Riyadh Dublin Doha Rome San Francisco Kuala Lumpur Milan	 Washington D.C. New York City Sydney Chicago Zurich Mexico City Boston New Jersey Milan Paris	 Washington D.C. San Francisco Houston Shanghai Chicago Boston San Diego Los Angeles Phoenix Seattle	 Sydney Amsterdam Stockholm Moscow London	 Sydney London Washington D.C. San Francisco New York City Chicago Boston Honolulu Toronto Montreal
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*Note: The names of Uber's products differ in each market.**

Facebook

WeChat had over 889 million monthly active users in 2016, 90% of whom were Chinese. In 2017 more than half of WeChat's users spend over 90 minutes a day on the app.^[1]



The Darker Sides of Smart Cities

Summing-up 1



- The urban impacts of smart solutions >shopping, logistics, are not seriously taken into consideration.
- The knowledge on impacts of smart technologies on urban development is limited and much social research is required.
- With gradual introduction of smart technologies economic and social polarisation will further increase >politically accepted?
- Digital infrastructure development will downgrade traditional urban planning, turning planners into city decorators, urban lawyers, GIS freaks, data garbage managers or just moderators.
- Local government administrations will have to be reorganized to meet the challenges of smart infrastructure development though do not have sufficient funds to cope with the many smart city challenges.
- Cities tend to favour technical solutions over socially balanced solutions.

The Darker Sides of Smart Cities

Summing-up 2

- Cities depend strongly on the technological and bargaining power of a few global ITC giants and monopolies, **convincing** cities to focus on and invest in smart technologies > **US and China**.
- Privacy concerns caused by big data collection and storage are largely neglected and sacrificed to convenience and business interests.
- The risk dimensions of smart systems are underrated.

There are multiple technological, social, economic, cultural, environmental implications



Economic Challenges



- There is little research and knowledge on the impacts of smart technologies for the local urban economy, on employment or on qualification requirements of the local labour force.
- The interest of all drivers of smart cities is to sell technology and services to cities and citizens, not to make life in cities for citizens better, though they are smart in selling smart technologies with such promises.
- Smart technologies will support individualism and raise the number of single households with consequences for the labour market and for residential property market > the number of single households will further increase.

Technological Challenges



- The developers of digital infrastructure will have to face that the **financial means** of local governments are **limited**.
- When building-up, **balanced** digital infrastructure in a market driven environment, local governments have to face and resist the influence and power of I&T corporations.
- The application of smart technologies change will change mobility patterns and logistic systems in cities.
- Smart technologies will favour higher densities and more high rise buildings and force local utility corporations to invest heavily in overhauling existing systems. Such investments tend to increase spatial disparities in the city.
- Digital infrastructure is prone to failures, accidents and cyber attacks.

Social Challenges



- Digital infrastructure can only gradually be developed and made available for all citizens and visitors. Hence unbalanced digital infrastructure will further increase social polarization in the city.
- The availability of new communication means and platforms to the civil society will unavoidable confront city governments with new requests for participation in urban development strategies, unless repressed by local or national governments.
- Social media and popular platforms will encourage more people to participate in urban development, which again will force local governments to respond and better organize public participation.
- Safety concerns of citizens will encourage local governments to control public spaces and neglect privacy concerns.
-

Drivers of Smart City Development

- Large global corporations developing, producing and selling digital technologies > **Samsung, Huawei, Sony, Siemens, Cisco**, who have identified the huge market potential of cities in competition.
- Powerful global corporations relying on the application of new technologies > **Amazon, Apple, Alibaba or the automobile industries**, being afraid of losing market shares aims to promote unlimited automobile mobility in cities > **Audi, Toyota, BMW, Mercedes**.
- Millions of start-ups developing applications of these technologies.
- Global and national think tanks advising governments in introducing such technologies > **IBM, McKinsey, Fraunhofer**.
- Businesses all over the world expecting to benefit from e-shopping.
- Local governments seeking to maintain the competitiveness of their economies and attract the creative class.
- Mayors and city marketing agencies aiming to profile their cities.
- Life style media promoting the new technologies.
- Research institutes and consultants seeking to get large grants and contracts for urban research on the application off smart technologies.



More Drivers of Smart City Development

- International governmental and non-governmental organisations, European Commission as well as city networks aiming to demonstrate their innovation policies and future orientation.
- Influential research institutes and think tank.
- Academic writers using the crusade to gain credit points.
- The media in search for young readership.
- Smart architects, urbanists and developers

.....and not to forget

- The global fun community
> techno and mobility freaks, tourists,
journalists.

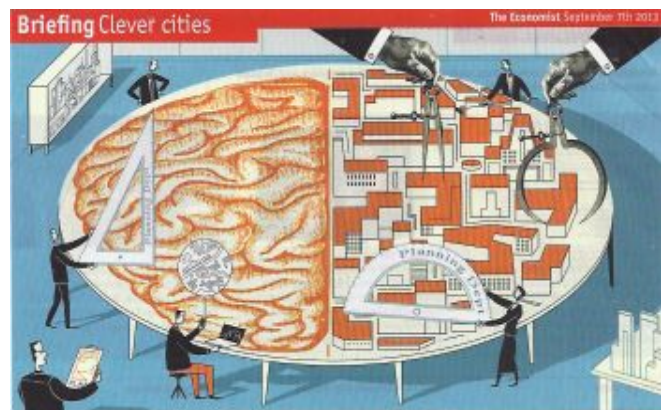


Pathways?

- > Will cities be different in the future, from what we know today?
- > Will citizens require different approaches to urban development?
- > Will urban neighbourhoods, will city centres have to be designed differently?
- > Will urban planning administration have to be re-organized?
- > Will urban planning regulations have to be changed

- Work
- Mobility
- Shopping
- Learning
- Governance

Digitalization will also have spatial implications in other fields, such as **housing, culture, leisure & entertainment, tourism or urban agriculture**



Pathways Mobility



- Smart technologies will revolutionize mobility in cities. Whether the self-driving car will conquer all city quarters remains open. It would force cities to rethink their transportation policies and plans.
 - > A comprehensive redesign of urban road networks is inevitable.
- Digitalization will make public transport more efficient and convenient and more popular.
- In the long run city centres will be closed for private cars, which are not equipped with smart driving technologies?
 - > Only smart buses and taxis will have access to the inner city!
- Smart technologies have made the renaissance of the bicycle in the city possible, though cities were not prepared to provide the appropriate space > **cycle lanes, parking, storage.**
- Smart technologies, bicycle and increasing popularity of car sharing will reduce traffic congestion in cities only marginally.

Pathways Work



- Smart industrial production (industry 4.0) will require **new locations** in the city which differ from traditional industrial sites. New locations will have to be multifunctional to meet the requirements of the highly qualified labour force, which would like to live nearby and use spare time for leisure or other activities.
- Innovative industries zones will have to be **functionally mixed** to accommodate all the services the new digital economy requires, and such zones will have to be mixed as much as possible with housing quarters, including household related social infrastructure.
- **Urban repair** will be a future challenges. It will bring along a **renaissance of crafts**, which will require affordable spaces in the built-up city.
- Digital start-ups will occupy and operate **co-working spaces** in obsolete industrial and office buildings spaces in the city.

Pathways Shopping



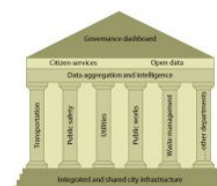
- The further advancement of e-shopping will change the functional structure of cities. City centres will become show-rooming spaces (fashion and design museums) of international brand shops meeting consumption and entertainment requirements of upper class citizens and visitors.
- Safe public spaces with multiple opportunities for all year round entertaining events will be required.
- Second class shopping streets and shopping centres will change their characters and turn into mixed-production, consumption and leisure spaces, or co-working spaces for start-ups.

Pathways Learning



- With the gradual evolution of e-learning the visibility of knowledgespaces (> knowledge spaces) in cities will disappear. Local commitment of universities and related knowledge milieus will weaken.
- Universities will/may change their approaches to higher education to benefit from e-learning technology. They will be encouraged to close down face-to-face undergraduate programmes. Inner city university campuses will shrink and be refigured.
- Universities and hospitals, focussing on distant learning and medicine may be tempted to change their locations, sell inner city campuses and operate from out-of-town locations.
- Schools in low density urban districts will be closed once e-modules are gradually introduced, with consequences for housing policy in the city-
- Following the logics of ranking, international corporate universities will gain competition and weaken local institutes of higher education, with implications for urban competitiveness and images.

Pathways Governance



Local governments will be driven by technology corporations and business interests to

- Overhaul their technical infrastructure systems and built-up new efficient and digital infrastructure in a market driven environment;
- Retrain or employ new staff for understanding and handling the interface between traditional and digital urban development;
- Recruit qualified new staff in the public administration and Initiate permanent training of public sector staff which is qualified to address the challenges and to communicate with technology providers on equal terms.
- **Monitor** local impacts of new digital technologies on urban development and and invest heavily in monitoring capacity and applied social and economic research.
- Screen and eventually revise urban development **regulations**
- Meet expectations of citizens, new formats of information and communication policies will be introduced, forcing local governments to balance **>top-down and bottom-up planning and decision-making processes.**

Pathways Governance Suggested by IDC



A Final Comment

In times of globalization, global competition and rapid technology change, the ongoing digitalization is a good opportunity to

- improve the quality of life of affluent and poor citizens,
- speed-up economic and urban innovation,
- Address mobility challenges in cities
- Create promising jobs for a new generation of university graduates,
- make a better use of energy, water and other resources,
- protect the environment,
- maintain the competitiveness of cities for qualified labour and investments.

The implications for the social and economic development of cities, however, have to be carefully monitored and assessed to avoid negative economic, social, cultural and spatial consequences and dependency on a few global players.

The smart rhetoric is impressive.....smart cities are **business first**.

Digitalization and smart city development require carefully concerted integrated approaches to coordinate urban sector policies, strategies and programmes.





The Big Brother Award 2018 in the “PR and Marketing” Category goes to the idea of a “Smart City”! The “Smart City” concept espouses the “Safe City”: a city covered in sensors, under total surveillance, remote-controlled and commercialised.

Smart cities” reduce their citizens to mere consumers, change consumers into data sources and our democracy into a privatised service.

A “Smart City” is the perfect combination of the totalitarian police state in George Orwell’s “1984” and the standardised, only seemingly free consumers in Aldous Huxley’s “Brave New World”.#

The term “Smart City” is a shining, colourful bag of tricks – it promises to everyone whatever they want to hear: innovation and modern city marketing, efficient government and citizen participation, sustainability and climate protection, security and comfort, perfectly phased traffic lights for cars and always a free parking spot.

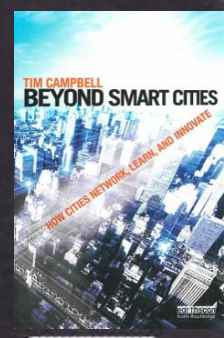
BIG BROTHER AWARDS.de



“FOR CONSUMERS, THE IOT HAS THE POTENTIAL TO DELIVER SOLUTIONS THAT DRAMATICALLY IMPROVE ENERGY EFFICIENCY, SECURITY, HEALTH, EDUCATION AND MANY OTHER ASPECTS OF DAILY LIFE”

There is a time and life beyond the smart city!

Challenges and Pathways of Urban Development in the Evolving Digital World



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