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- Introduction and first Definitions
- Teaching at ETH: Smart Cities
- MOOCs from ETH: Smart Cities
- Resources: iBook, pdf, links
- Expected outcomes from future designers
- Exercises
- Discussion

Welcome to IFEZ U-City Integrated Operation Center.



## "Polytechnikum" founded in 1855 – Driving Force of Industrialization in Switzerland

III



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# Smart City - Definitions

http://www.smartcity-schweiz.ch/en/smart-city/

"Smart City" characterises a city that

- systematically applies information and communication technology as well as technology conserving resources on its way to post-fossil society
- intends to become independent of fossil energy carriers on the long run
- connects new technologies for infrastructure, buildings, mobility etc. to uses resources such as energy or water as efficiently as possible
- anticipates and realises future sustainable forms of mobility and the necessary infrastructure
- forces integrated (city) planning processes, e.g., for energy planning
- creates the spaces for innovation and the testing of new ideas (cleantech)
- installs management systems ("Good Governance") to enable optimised leadership in the different areas and - through a holistic controlling - for developments to be reported in a measurable and verifiable manner
- provides the appropriate personal and financial resources
- The integration and interconnection of these areas is the characteristic of a smart city with the aim of realising the potential for ecologic and social improvements.

In summary:

- "A smart city offers its inhabitants maximal life quality with minimal consumption of resources, based on an intelligent interconnection of infrastructure (transport, energy, communication etc.) on different hierarchic levels (building, quarters, city).
- "intelligent" in this context does not necessarily equate information technology. Passive or self-regulating mechanisms are to be preferred to actively controlled approaches when having similar performance."
- "Smart city" is no new label, but describes a deepening engagement for the expansion of existing activities and projects of an innovative city possessing the "European Energy Award". For those cities, the Smart City programme offers new possibilities for support of their innovative and "smart" projects on the way to achieving the ambitious goals.

# Smart City - Definitions

For the giants of the technology industry, smart cities are fixes for the dumb designs of the last century to prepare them for the challenges of the next, a new industrial revolution to deal with the unintended consequences of the first one. Congestion, global warming, declining health—all can simply be computed away behind the scenes. Sensors, software, digital networks, and remote controls will automate the things we now operate manually. Where there is now waste, there will be efficiency. Where there is volatility and risk, there will be predictions and early warnings. Where there is crime and insecurity, there will be watchful eyes. Where you now stand in line, you will instead access government services online. The information technology revolution of the nineteenth century made it possible to govern industrial cities as their population swelled into the millions. This revolution hopes to vrest control over cities of previously unthinkable size—ten, twenty, fifty, or even one hundred million people.

From: Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia (Englisch) Gebundene Ausgabe - 5. November 2013 von Anthony M. Townsend (Autor)

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## URBAN COMPLEXITY "Can we find hidden universalities in the dynamics of cities to predict future urban developments?"



**SCHLÄPFER** 

**Team** Dr Markus SCHLÄPFER Prof. Dr Peter SLOOT / NTU Aike STEENTOFT Partners



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## ETH Zurich Information Architecture MOOC

Massive Open Online Courses (MOOCs) on Future Cities: An overview to understand a city's people, components, functions, scales and dynamics, as precondition for its sustainable design and management. The courses explore the city as the most complex human-made "organism" with a metabolism that can be modelled in terms of stocks and flows and as a complex system. We open a holistic view on existing and new cities, and study data-driven approaches for the development of the future city, based on crowdsourcing and sensing. In total, more than 60'000 students from 170 countries have registered.





5% of students





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## Information Cities

### Prof. Dr. Gerhard Schmitt

This book is available for download with iBooks on your Mac or iOS device. Multi-touch books can be read with iBooks on your Mac or iOS device. Books with interactive features may work best on an iOS device. iBooks on your Mac requires OS X 10.9 or later.



### Description

What is a city? What is an urban system? Do we understand these most complex man-made artefacts in their entirety? Why do people move into cities? When do they prefer to stay in rural areas? Do cities need skyscrapers? Are there cities without density or are there dense settlements without being a city? Some cities are liveable for the majority, others just for a few. As we enter the first urban century, we start to realise that today's cities are not sustainable, no matter from which side we look at them. Prerequisites for their transformation towards liveability, sustainability and resilience are better knowledge and ability to change. Understanding the city and knowledge about the city should be the base for change. As we begin to realise that cities are not neutral objects, but that people define the city, the mobile citizen gains a central role in the definition of the future city.



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### **ETH** zürich

## Innovation Ecosystems – the "Zurich" Case





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# Conclusions

- Smart cities are emerging in all parts of the world
- The term applies both to existing and new urban and urban-rural systems
- Massive Open Online Courses MOOCs are an important vehicle to increase the smartness and responsivemness of cities
- The degree of smartness and responsiveness of a city will determine its progress

## **INFORMATION ARCHITECTURE OF CITIES**

QUA-KIT online tool MOOC exercises



Information Architecture

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Prof. Dr. Gerhard Schmitt

## MOOC & ETH iA course

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## MOOC & ETH iA course

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- 1. MOOC platform in edX
- 2. ETH Moodle for collecting the exercises



ETH Zurich

Courses - Programs - Schools & Partners About -



Register

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Here S AF subjects > Available and > shart block Smart Cities In Secolory Learnihow data and information impact the started on September 12, 2015. design, sustainability and resilence of future. cities. Enroll Now ETH zürich and ears about its other programs. Longhe NO weeks 1 Roviews 3/5 ###### About this course 25 Mar. Higgs proved. Objective first and forement built for provides and in today's work: provide produce large amounts of Price: THE valuable data, thus contributing to what we call "smart doles," //s almost every building and every day Add a Verified is a prototypy, these communities are in the party stage of development and require specific attention. Design at a line SND and expertise earny advance. in inthulian: Clink Swimpre (\$ Bridgeria Peditionian What you'll learn A Level: introductory: Synthe end of the course you will be able to: C.S. LongLogett Moglion. Understand the concept of smart cities, why these are still prototypes and what the thailenges are. Identify the principle of stocks and flows of information in other at different scales. all shires Fuglish : INCOME? (MADE Understand the concept of dileten design science and its importance for responsive titles. Understand the concept of complexity science in the context of architecture and displanning. Learn through ditizen design science how you can interact and get involved in the planning of your. Associated Programs: own cities. Articulate what a responsive cityls, and identify the criteria for a day to be responsive. The survey Report Other Meet the instructors Share this course with a friend 00000 Gerhard Schmitt Christoph Hölscher Dirk Helbing Professor of Information Professor, Countilive Science Professor, Computational Architecture. ETH Zurich Social Science

ETH Zurich

# MOOC

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2.4 Computery Decrete Data May 20. 2016 at Computery Decrete Data May 20. 2016 at 00:00, 10	nizenetiona partners
	The orgoing plicit phease is too and on a cluster of GL houseawith in the UF-Section of Heyelicities. Through Innovative design and organisational models, the project sims to develop a comprehensive and sustainable.
<ul> <li>Weak 3 (25/10/36+ 03/11/16).</li> <li>Saunt Cities</li> </ul>	Informal satilarment uppysding costagy centred on four core components: a two-cory housing providype, porticipatery spatial planning, ecological landscape management, and incograted i valineeds programming,"
	For more information should Empower Shack project please click.
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	QUA-RT is a web platform for viewing and manipulating simple other geometry. Logged in vie eOI platform - you can work us a slight design problem, share your ideas tegether with design proposals, view and discuss orban layouts from other participants.
	You will get access to your own working canvas of QUA-KIT to design your urban layout. When your design is completed you will need to save your proposal. Afterwards, you can a ways go been to your design and change Is in Sth Week your design tool, will be freem within in that week you will have an eventue where all the grittless from the student are compared. Until then free free to improve your design according to the free besits that

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# **Exercise 1**

## Conduct the compulsory exercise 1 in the MOOC

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<ul> <li>Week1- warm-up Week (15/06/12 - 15/06/12)</li> </ul>	C Previous B	lind 3					
<ul> <li>Weak 2 (20/02/17 - 26/02/17): Introduction</li> </ul>	QUA-KIT - Online design tool Wösekmerktha sept	view over instructs					
2.1. Introduction to Smart Office 2.2. Information Arthitecture	Welcome to your Enst "Smart Cities" exercise. Nou will be working on this exercise during the whole ourse and your three main tasks will take place in werk 2, week 6 and week 3.						
2.1. Urban modelling and simulation	The following is the information for your first task (week 2):						
2.4 Additional Material	Backgrownik						
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Week 3 (27/02/17- 05/03/17): Smart Otics     The angoing pilot phase is focused on a cluster of 66 houses within the BT Section of Khayelistra. Through increasive design and organizational models, the project sims to develop a comprehensive and sustainable is forward end sustainable. For a cluster or provide the form of the science comprehensive and sustainable.							
<ul> <li>Week 4 (06/03/17 - 12/03/17): big data and</li> </ul>	participationy spatial planning, ecological landscape management, and integrated helino	ods programming."					
stock and flows of information	For more information about Empower Shack project please click.						

### First exercise: QUA-KIT online tool



### Background:

The following exercise is based on the on-going Empower Shack project in Cape Town, South Africa.

"Empower Shack is an interdisciplinary development project directed by U-TT, ETH Zurich and the local NGO Ikhayalami Development Services, in collaboration with the BT-Section community and associated local and international partners.

The ongoing pilot phase is focused on a cluster of 68 houses within the BT-Section of Khayelitsha. Through innovative design and organizational models, the project aims to develop a comprehensive and sustainable informal settlement upgrading strategy centered on four core components: a two-story housing prototype, participatory spatial planning, ecological landscape management, and integrated livelihoods programming."

For more information check the following link: <a href="http://u-tt.com/project/empower-shack/">http://u-tt.com/project/empower-shack/</a>

### First exercise: QUA-KIT online tool



Using our online tool QUA-KIT, your task is to propose an urban layout that will best help improve the living situation of the people in the cluster of 68 houses described above.

QUA-KIT is a web platform for viewing and manipulating simple urban geometry. Logged in via edX platform you can work on a single design problem, share your ideas together with design proposals, view and discuss urban layouts from other participants.

You will get access to your own working canvas of QUA-KIT to design your urban layout. When you finish you can click on the right bottom corner to select the option save. You can always go back to your design and change it. QUA-KIT will guide you with more information and step-by-step instructions.

Please follow the link to start. [here will be a button to <a href="https://qua-kit.ethz.ch/viewer">https://qua-kit.ethz.ch/viewer</a>]

# Exercise 1

Conduct the compulsory exercise 1 in the MOOC

### Additional part for ETH course:

Make a screen shot of your design in the QUA-KIT web modeler. Create a word document and add the screen shot together with a description of your design and why you came up with that arrangement.

Upload the document here in moodle by 27.02.2017

## MOOC discussion panel:

- Form 6 groups of 3 to 4 people and start looking at the discussion developing in the discussion panel of the MOOC.
- After seminar week (27.03.2017), each group has to choose one interesting discussion and start participating by writing comments about the topic being discussed.
- In the last lecture (15.05.2017), each group will have a 7 minute presentation about the discussion they followed and how they contributed.