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Welcome to the yearbook for the second edition of our IGLUS Executive Master! As you will come to learn while reading, we have made significant progress since our first edition. Not only have we increased the number of participants in our program, but we have also been able to attract participants from all over the world now making IGLUS a truly global and even more unique program. We have also sharpened the focus of our program: on the one hand, we have reduced the number of modules from seven to six, and, on the other hand, we also added three more cities, that we each visited for one week, namely Mexico City, New York City and Barcelona, each bringing new rich experiences to the program. We have also defined a clearer conceptual framework for our program which has allowed us to sharpen the content to focus much more clearly on three performance dimensions of urban infrastructure systems, namely efficiency, sustainability and resilience.

All this has been achieved thanks to the excellent collaboration we have come to entertain with our University partners in the different host cities – Tecnológico de Monterrey (Mexico City and Guadalajara), Istanbul (Kadir Has University), Seoul (Sunkyunkwan University), Dubai (American University of Sharjah), New York City (City University of New York, CUNY), Detroit (Michigan State University), Dortmund (Technische Universität Dortmund) and Barcelona (Universidad Politecnica de Catalunya) – as well as with our global industry partners (BCG, Cemex, IBM, Schneider Electric, Swiss Post, Transdev, and Veolia). I would like to thank them along with all lecturers and staff for making the IGLUS vision a reality.

I also take great pride in announcing another new addition to the IGLUS portfolio: the successful launch of our Massive Open Online Course (MOOC) Managing Urban Infrastructures on the Coursera platform in February 2016. Not only have 9000 people followed this course so far, but moreover, this MOOC has given us global visibility and recognition, attracting enormous interest to our Executive Master program. In the future, this MOOC will become an integral part of our Executive Master: the basics will be taught online, allowing more time for in-depth discussions with the lecturers and among the participants.

Finally, I am happy to announce that the first IGLUS participants have completed their Masters theses and have successfully graduated. Congratulations! And as this yearbook goes to press, we have already started our 3rd edition, with yet other new developments in the pipeline. But more about this later! Stay tuned and many thanks for your interest in our original program!

Prof. Matthias Finger
Executive Summary

Goals

The IGLUS project, hosted by the Chair Management of Network Industries at EPFL, Switzerland, is defined as a global Action Research project that aims to improve the performance of cities via the innovative governance of urban infrastructures.

The project is structured around the IGLUS Executive Master’s Program, accredited by EPFL, which aims at empowering city managers, practitioners and politicians by providing them with cutting-edge knowledge and the tools to improve the performance of their different urban infrastructures.

In the first phase of the IGLUS project, five major urban infrastructures and two cross-cutting issues were covered (Metropolitan Finance and Resilience Profiling).

The main performance dimensions that IGLUS addressed in its first phase were:

- Efficiency
- Resilience
- Sustainability

Achievements 2015–2016

- **Training modules**: Each of two weeks, were organized in seven cities around the world.

- **More than 500 hours of training**: Lectures, workshops, visits were delivered.

- **150 Lecturers**: From academia, cities, industry and international organizations have partaken in the training events.

- **18 Nationalities**: Represented in the IGLUS training modules including: Mexico, Colombia, Brazil, Venezuela, China, Mongolia, Turkey, UAE, Bahrain, Greece, Russia, Poland, Italy, Spain, Germany, United States, Switzerland, South Africa.

- **59 Participants**: Attended at least one of the IGLUS training sessions.

- **30 Participants**: Were officially registered in the complete IGLUS Executive Master Program.

- **34y Average age**: Of the participants in the IGLUS Executive Master.

- **96 Percentage**: Of the training sessions rated good or very good by the participants.
The IGLUS Team

Professors

Prof. Matthias Finger

Prof. Matthias Finger is the Director of the IGLUS project. Since 2002 he has been a Professor of Management of Network Industries at EPFL. He holds a PhD in Political Science from the University of Geneva and has been, before joining EPFL, an Assistant Professor at Syracuse University (New York), an Associate Professor at Columbia University (New York), and a Professor of Management of Public Enterprises at the Swiss Federal Institute of Public Administration. His main research interests relate to the liberalization, re-regulation and governance of infrastructures in the transportation, energy, and communication sectors. He is also the Co-Editor in Chief of the Journal Competition and Regulation in Network Industries.

Prof. Janice Beecher

Prof. Janice A. Beecher has served as Director of the Institute of Public Utilities at Michigan State University since 2002. She has a B.A. in Economics, Political Science, and History from Elmhurst College and a M.A. and Ph.D. in Political Science from Northwestern University, where she completed a dissertation on public utility regulation. Her areas of interest include regulatory theory, institutions, and policy; comparative industry analysis; and utility pricing and rate design. She has particular expertise in the structure, economics, and regulation of the water industry.

Prof. Karsten Zimmermann

Prof. Karsten Zimmermann is a Professor at the Faculty of Spatial Planning at the Technical University of Dortmund where he holds the Chair for European Planning Cultures. He is educated as a political scientist and has dedicated most of his academic work to the study of cities and regions. Currently, he is involved in a larger research project about knowledge generation in local climate politics. Further research topics include planning theory and planning practices in Europe and the transformation of post-industrial regions. He is the President of the European Urban Research Association (EURA) and coordinates the international master program Transformation of Post-Industrial Regions (ToPIR) at the Dortmund School of Planning.
Prof. Jerry Kolo

Prof. Jerry Kolo is a Professor of Urban Planning, and currently Coordinator of the Master of Urban Planning program at the American University of Sharjah (AUS), Sharjah, United Arab Emirates (UAE). Jerry joined AUS in 2006/2007 from Florida Atlantic University, Fort Lauderdale, Florida, USA, where he was a Professor of Urban and Regional Planning, and Founder and Director of the Center for Urban Redevelopment and Empowerment (CURE). His areas of teaching and research specializations are political ecology; public policy planning; and sustainable community planning.

Prof. Andrea Finger-Stich

Andréa Finger-Stich has a MSc in Forest Resources Management from Syracuse University, New York State, USA and holds a PhD from the Institute of Forest Economy at Freiburg University in Germany where she wrote her dissertation on participation in the management of communally owned forests in the French and Swiss Alps. She worked for the United Nations Research Institute for Social Development, researching and publishing on the social impacts of protected areas in France and the socio-environmental impact of shrimp aquaculture. She then worked for WWF (World Wide Fund for Nature International) and IUCN (the World Conservation Union) as an international forest policy analyst. She is teaching on urban green infrastructures, and their impact on the city in terms of resilience and sustainability.

Prof. Robert Paaswell

Dr. Robert Paaswell is a Distinguished Professor of Civil Engineering at the City College of New York, the flagship institution of The City University of New York (CUNY). He served as its Interim President from 2009-2010. He is the emeritus Director of the College’s University Transportation Research Center, Region II and the founding Director (2001-present) of the CUNY Institute for Urban Systems (CIUS). He is also Site Director of the new NSF sponsored Industry/University Cooperative Research Center: Sustainably Integrated Buildings and Sites Center. A civil engineer and former CEO of the Chicago Transit Authority, Dr. Paaswell is an internationally recognized expert in public transportation issues and consulting. He is former Chair, Transit Standards Consortium and former Chair, ASCE Committee on Peer Review of Public Agencies. Dr. Paaswell is a Distinguished Member of the American Society of Civil Engineers.
Prof. Miguel Montoya

Miguel A. Montoya has a B.A. in Economics, a Master degree and a PhD in Applied Economics at the Universidad Autonomia de Barcelona (UAB), Spain. Actually is Professor and Associate Director of the Graduate and Research in the Tecnológico de Monterrey (ITESM), Campus Guadalajara. He had been Director of the Department of Economics and Law, Europe Advisor for Tec de Monterrey, Director of Barcelona (Spain) Office, and Director at the Office of International Affairs. He is part of the National Council for Technology and Science (CONACYT-Mexico), The Economic Council of Business Association (COPARMEX-Mexico) and Academy of Management, among others. His areas of interest are Multinationals Companies (Multimexicanas), Business for BoP and Utilities Regulation.

Prof. Moon-Gi Jeong

Prof Moon-Gi Jeong is a Professor at the Department of Public Administration and Graduate School of Governance in Sung KyunKwan University (SKKU), Seoul. He also serves as the Director of the Sustainable Urban Development Institute in SKKU. He holds a B.A in Public Administration from SKKU, a M.A in Public Affairs from University of Texas at Austin and a PhD from Florida State University. His main interests are in Local and Urban Governance, Sustainable Development and Innovation.

Prof. Aybike Ongel

Aybike Ongel is an assistant professor of Civil Engineering and vice director of Civil and Mechanical Engineering School at Bahcesehir University in Istanbul, Turkey. She received her B.S. in Civil Engineering from Bogazici University in 2002, and M.S. and Ph.D. in Civil and Environmental Engineering with an emphasis in transportation from University of California Davis in 2003, and 2007, respectively. From 2008-2010, she was an assistant professor in the Civil Engineering Department at Kultur University, Istanbul and a lecturer at Bogazici University, Istanbul. From 2010-2012, she worked as a Visiting Research Associate in Road Engineering/Sealing Components Department at EMPA Swiss Federal Laboratories for Materials Science and Technology. Her research interests include life cycle assessment, environmental and health effects of transportation noise, pavement materials and recycling, and transportation policy.
PhD Candidates

Maxime Audouin
Maxime Audouin holds a Bachelor of Sciences in Environmental Engineering, and a Master of Sciences in Energy Management from EPFL. After some professional experience in urban related organizations (Veolia in Paris, Ras Al Khaimah Public Works in the UAE), Maxime joined the IGLUS team through research oriented projects. He now works as a full time PhD student for IGLUS and focuses on Mobility as a service for his PhD thesis. His main areas of interests are urban systems, governance and regulation, transportation integration, technology and innovation management.

Ricardo Ocampo
Ricardo Ocampo was born in México on June 12, 1989. He received a Bachelor of Science degree in Industrial Engineering and a Master of Science degree (with highest honors) in Computer Science from Tecnológico de Monterrey He is currently pursuing a PhD at Chair MIR, College of Management of Technology (CDM), EPFL. His research interests cover the use of machine learning algorithms to improve the efficiency of processes in cities.

Mohamad Razaghi
Mohamad Razaghi is the general manager of the IGLUS project. He holds a Master of Business Administration and a Bachelor of Science in Industrial Engineering from Sharif University of Technology, Tehran, Iran. Alongside managing the IGLUS project (Innovative Governance of Large Urban Systems), Mohamad wrote his doctoral thesis about the learning dynamics of urban practitioners in executive training programs. His main areas of interest are learning, governance of complex socio-technical systems, urban transportation systems, technology and innovation management, strategic management and policy making processes.
Staff

Catarina Amarante de Oliveira Neves
Born near São Paulo Brazil in 1993, Catarina received a Bachelor's in Mechanical Engineering in 2015 from the Johns Hopkins University in Baltimore, Maryland. During her undergraduate years, she participated in the DAAD RISE program and did research on the development of net-zero energy buildings fit for the expected mid-century climate at Hafen-City University in Hamburg, Germany. Her main interests are sustainable urban development, energy efficiency and environmental policy and economics.

Cyril Wendl
Cyril is the web developer and designer of the IGLUS websites and other platforms of the MIR. He has a Bachelor degree in Geography, Informatics and Environmental Sciences from the University of Fribourg and currently studies Environmental Sciences and Engineering at EPFL. He has been actively committed as a co-founder and President of the student organization for sustainability at the University of Fribourg (NEUF), and has initiated the Bike2University competition. Cyril is keenly interested in sustainability issues and computer science.

Rebecca Himsl
Rebecca is the Editor of IGLUS Quarterly, a publication on governance, innovation and performance in cities published as part of the IGLUS project, and also works as a program assistant for the IGLUS Executive Masters Program. Originally from Canada, she obtained her BSc. from the University of Alberta specializing in Environmental Earth Sciences and minoring in Human Geography. Having spent enough time in the Canadian Boreal forests working on carbon modeling, she moved to Lausanne to pursue her MSc. in environmental modeling and monitoring at EPFL.
The IGLUS Team

Arnaud Besse-Ciller

Arnaud is French and holds a Bachelor’s degree in Environmental Sciences and Engineering from École Polytechnique Fédérale de Lausanne (EPFL), Switzerland. Last year, he was fortunate enough to take part in a year long exchange program at Chalmers University of Technology (Gothenburg, Sweden) where he did an internship with the Urban Metabolism laboratory. He has also volunteered in Indonesia in a program designed to help build sustainable houses and to bring awareness to environmental issues. In 2015, through the Master of Energy Management and Sustainability at EPFL, he conducted two research projects with IGLUS, where he studied the social dimensions of the implementation of the EMV Ticketing system in the London Transportation system; and the governance of the introduction of new regulatory frameworks for ICT based cab hauling services such as UBER in Brazil.

Elena Labenets

Elena received a Bachelor’s degree in Computer Sciences from Bauman Moscow State Technical University in 2012 and began working as a programmer but soon discovered that recycling and waste management were much more exciting. She is now enrolled in the Environmental Engineering bachelor program at EPFL, which she sees as a stepping stone to her next destination.
Global Training Series

The IGLUS Global Training Series remained at the core of IGLUS' activities throughout our second year of existence, albeit updated compared to the first edition. Throughout these training series, we invited experts with different backgrounds, from academics to urban practitioners to city professionals, to lecture in front of the participants in the Executive Master program. We decided to leave more room for discussions than in the first edition, as we noticed that the sharing of experiences from the participants, depending on the topic covered, was just as important as the lecture content.

With input from professionals from many different fields, our discussions proved to be very enriching, and consequently enabled us to refine our analytical tools and our understanding of the city as a system. We were able to define three key areas which are essential for enhancing urban system development, namely, resilience, efficiency and sustainability. With these important topics elucidated, we decided that we would dedicate each module of our training programs to one of our three performance dimensions. We hoped that by structuring the course in this way, we would be able to understand how to best govern all urban infrastructures and to guide them towards efficiency, resilience and sustainability.

In this second year of our existence, we also tested the idea of visiting 2 cities in the same module, with the goal of creating a context in which we could compare the approaches used to address the same problem in two different urban systems, within the same country and culture. With this objective in mind, we organized 6 unique modules: Mexico City – Guadalajara, Dubai, Istanbul, Seoul, New York – Detroit, and Dortmund – Barcelona. Each of these six very different training series presented a different context to explore and learn from for our research. The map on the right side shows the modules we organized in 2015 and 2016.
In November 2015, the first module of the second edition of the IGLUS Executive Master took place in Mexico City and Guadalajara. The module was organized by EPFL in collaboration with Tecnológico de Monterrey, Mexico City and Guadalajara campuses, and focused on the social challenges that must be tackled if an urban system wishes to attain their urban resilience goals.

Through unprecedented exponential growth and urbanization, modern cities have come to develop into tentacular agglomerations that sprawl over multiple jurisdictions, often reaching huge sizes. Once these systems have reached a size from which there is no ability to return, we must ask ourselves how such systems would react in response to external disturbances, especially given the legacy of such cities, and their on-going dynamics. In order to deal with such systems, we must ask ourselves what techniques authorities can use when planning existing cities to minimize the impact of potential future disasters and enable them to rapidly return to a functioning state and guarantee a certain quality of life for their inhabitants. How can we motivate the stakeholders of different urban infrastructure systems to collaborate on creating a more robust, resistant, rapid and redundant system? What policies and regulations must be in place in order to transform our cities into a system that is resilient to the impacts of external hazards? These were the questions that we tried to answer during our two weeks in Mexico. Throughout these sessions, particular attention was given to the role of citizen involvement, community building and awareness campaigns, which were determined to be the first stepping stone on the path towards creating a more resilient urban system.
Why Mexico City and Guadalajara?

With over 21 million inhabitants, Mexico City is the third most populated city in the world, unquestionably qualifying the city as a Large Urban System. Given its geographical location, the city is under consistent threat from certain environmental hazards such as volcanic or seismic activity, water availability and flooding. The Guadalajara Metropolitan Area faces similar challenges. As the second largest metropolitan area in Mexico, the region has over 4 million of inhabitants and is located near the Pacific Ocean, which exposes the city to regular flood and hurricane threats. Both of these large urban systems face great risks in terms of natural disasters, but they also face similar social challenges such as security, poverty and widening social gaps. Where these two cities diverge is in their governance structure: whereas Mexico City benefits from a special metropolitan status that facilitates collaboration among sub-districts and municipalities, Guadalajara, which is composed of 8 distinct municipalities, lacks such administrative organization, which makes realizing the same level of coordination as in Mexico City very difficult.

Field Visit to Ecobici and bike tour with the bike sharing program EcoBici (Mexico City)
Over the course of our two weeks in Mexico, we explored various cases from the two cities that made it clear that social resilience was absolutely necessary if we hoped to create urban systems that are truly resilient. For example, introductions to the Mapaton initiative by PIDES and Ecobici, the bike sharing program in Mexico City, provided exemplar cases of community building and citizen empowerment and showed how such systems could play an important role in creating resilient communities.

Over the course of these two weeks in Mexico we explored the links between resilience and the sustainability and efficiency performance dimensions, and through the different presentations, discussions and field trips, the participants came to understand that achieving resilience does not automatically result in sustainability, nor efficiency; instead, a delicate balance between the three dimensions must be found.

Field Visit to the control center of SITEUR (Guadalajara)
Presenters in the IGLUS Mexico City — Guadalajara Module

Experts from the World Bank, UN Habitat, World Resources Institute, ITDP, former secretaries from the Mexican government, Veolia, Tec de Monterrey and EPFL were present in this module to discuss the governance frameworks required to develop more resilient urban systems.

Topics covered

- Urban Resilience Profiling and Assessment Tools
- Urban Green Infrastructures and Social Resilience
- Social Innovation in Urban Mobility Systems
- Water Governance and Sustainability
- Metropolitan Financing for Resilient Urban Systems

Visit to Xochimilco, Mexico DF’s green lung
Dubai, United Arab Emirates

Sustainability

In January 2016, the second module of the second edition of the IGLUS Executive Master took place in Dubai. The module was organized by EPFL in collaboration with the American University of Sharjah and focused on the environmental challenges that must be tackled in order to make urban systems more sustainable.

By 2008, more than half of the global population was living in urban areas, marking a point of no return in modern trends of urbanization. These fluxes of people migrating to cities has only continued to grow since, and by 2015 54% of the world’s population lived in cities - a number that is expected to rise to 66% by 2050. Evidently, our cities are expending very rapidly, often quicker than they were expected to, or at least more rapidly than they had been designed for.

Such exponential growth gives root to two types of issues. On one hand, the internal dynamics of the urban system are disturbed, that is the system is hosting more people and more people, and at a rate to which the urban infrastructure are not adapted. Saturated transportation infrastructures and power shortages are direct consequences of this inability to adapt. On the other hand, such growth also disturbs the dynamics between an urban system and its surrounding environment. In order to fulfill their immediate demands, cities are forced to extend their influence into the environments that surround them. Consequently, as the cities sprawl outwards to accommodate their ever-growing populations, the surrounding hinterlands become heavily degraded.
In such situations, we are forced to ask ourselves if and how cities can be expanded in a more sustainable way? That is, how can we fulfill the needs of today’s populations without compromising our capacity to respond to our future needs. Because such visions require the engagement of all stakeholders in the urban system, reaching sustainability goals, especially in the face of such exponential population growth, requires that we define new forms of urban governance; this was the objective of the IGLUS-Dubai module.

**Why Sharjah-Dubai?**

Over the last decades, the emirate of Dubai has experienced one of the highest rates of urban growth worldwide. Only two decades ago 700,000 people were hosted within the borders of the emirate. Today the metropolitan area is considered to be a large metropolitan area spanning over the emirates of Dubai, Sharjah and Ajman that is home to more than 5.3 million people (of which only 10% are Emiratis) and also receives an influx of thousands more who make the daily commute into the region from the northern emirates for work. In a country where borders have been historically important, jurisdictional boundaries no longer seem to be a relevant concept thereby perturbing the internal dynamics of the metropolitan area. Although the Dubai Metropolitan Area has accomplished many impressive developments in terms of building construction, their rapid construction has on occasion called the sustainability into question.

Furthermore, the United Arab Emirates are known to suffer from extreme water scarcity and limited natural resources - factors that drastically increase the stakes for the rapidly developing emirate.
Through our two weeks in Dubai and Sharjah, we tried to gain an understanding of the limitations in the existing governance structure. Our goal was to determine how efficient use of scarce natural resources and the development of renewable resources could be implicated.

In this module, particular attention was paid to the regulations in place that enabled the development circular economies, especially in the waste and energy sectors. During the series we also had the chance to visit the Expo2020 headquarters to learn about Dubai’s strategy to benefit from such mega events to remedy the current unsustainable development.
Presenters of the IGLUS Sharjah - Dubai Training Module

Experts from the World Bank, UN Habitat, Ministry of Energy, MOFA - Directorate for Climate Change, DCCE, Abu Dhabi Urban Planning Council, Ras al Khaimah Public Works, ARUP, Veolia, the American University of Sharjah and EPFL were present in the IGLUS-Dubai module to discuss governance systems and practices that stimulate the development of sustainable urban systems.

Topics Covered

- Waste Management and Urban Sustainability
- Waste to Energy and Circular Economies
- Mechanisms for Climate Change Mitigation Financing Sustainable Metropolitan Systems
- Integrated Transportation and Land Use Planning
- Public Private Partnerships

Visit to the Road and Transport Authority (RTA) operation’s center
In April 2016, the third module of the second edition of the IGLUS Executive Master took place in the city of Istanbul. The module was organized by EPFL in collaboration with Kadir Has University, and focused on the social challenges that must be tackled in order to create resilient urban systems.

Urban growth can be motivated by a wide range of factors. Often when driven by social or environmental drivers, urban systems can grow at a rate which is detrimental to the city; when this happens, it can be very difficult to remedy. For example, insufficient planning and a lack of a long-term vision can cause a city to develop along a damaging trajectory from which becomes very difficult to deviate. These concerns are especially valid when unexpected external shocks occur and drastic and immediate action in the urban system is needed. In such a complex situation we must learn how a system that was not designed to absorb such shocks can be transitioned to a more resilient system. In other words, what governance measures can successfully drive a legacy system to become more resilient?

Before a city begins to answer such a question, a clear distinction between disaster management and resilient planning must be made. Urban practitioners need to understand, from both a managerial and governance perspective, what factors are key for planning resilient urban systems, and how do these factors enable a city to rebound from an external shock and minimize its effects.

The interrelatedness of all urban infrastructures is also especially important when considering the resilience of a city. Thus, in order to create resilient systems one must consider how they can create links between the current infrastructure to minimize the impacts of shocks on the urban quality of life.

Field Visit to the IETT Metrobus (BRT) operation and control center
Why Istanbul?

Between the 1950’s and today, the urban population of Istanbul has exploded from just over 1 million people to more than 20 million. Expanding across the Bosphorus Strait into Europe and Asia, in just over a century, the city has become one of the largest urban systems in the Old World. Because of its rapid expansion, authorities failed to account for many non-negligible environmental factors during urban development. One such example lies in the fact that the city is located near Marmara breach, making it highly susceptible to earthquakes and calling into question important issues of urban resilience.

Due to political reasons, Istanbul has never attempted to regulate its expansion and even opted to accelerate development. Because of this, development has occurred without long-term strategies, and many issues have since come to light across various dimensions of the urban system threatening to collapse the entire system. Urban mega projects, such as the city’s third bridge, third airport, and the Istanbul canal are underway to attempt to mitigate this threat.

These concerns are compounded by the anticipated arrival of the “big one”, an earthquake that is expected to occur in the coming decades and will have a greater magnitude than any earthquake so far in the history of Turkey. Under these circumstances, it is evident that things need to change urgently in Istanbul, both in terms of how the city is evolving and how infrastructures are run in order to ensure that the system will be able to absorb the impacts of the imminent disaster, as well as those of potential future shocks.
Istanbul also presents an interesting case in that it provided us with the opportunity to see how urban systems organized under a metropolitan framework could help (or not) to emphasize resilience planning on the administrative agenda and to find more concrete ways to coordinate actors and finances. Based on Istanbul’s population size, organization and urban challenges, we could compare the city’s practices with those of Mexico City and draw conclusions that allowed us to delve deeper into our reflections on urban resilience.

In the IGLUS-Istanbul module, particular attention was paid to understanding how housing infrastructure development (and particularly redevelopment) influences the expansion of other urban infrastructures and how, based on governance structure, it can facilitate a transition towards more resilient urban systems.
Presenters in the IGLUS-Istanbul module

Experts from the World Bank, UN Habitat, Istanbul Technical University, Bahcesehir University, Boston Consulting Group, IBM, Kadir Has University, and EPFL presented in this module and discussed the governance of urban infrastructure systems that is required to develop more resilient urban systems.

Topics covered

- Disaster Management vs. Sustainable and Resilience planning
- Sustainability of Urban Mega-projects
- Urban Regeneration and Housing Profiling
- Public Private Partnerships
- Optimization of Existing Transportation Infrastructures
In June 2016, the fourth module of the IGLUS Executive Master second edition took place in Seoul. The module was organized by EPFL in collaboration with Sungkyunkwan University and focused on the technological dimensions that need to be considered in order to make urban systems more efficient.

In 1996, only three smart transportation card systems were in operation worldwide. Today, there are more than 360 of these smart ticketing systems in place in cities around the world where they allow for a better management of fare systems, and bring more convenience to the users.

Globally, increasingly more cities are introducing Information and Communication Technologies (ICTs) into their infrastructure systems to optimize and monitor the provision of urban services to their citizens. ICTs introduce many advantages by facilitating the collection and monitoring of data produced by many urban infrastructure systems, such as the flow rate of wastewater in sewage systems, the rate of congestion on any given bridge, or the number of cars that are illegally parked on a specific street. But they are equally valuable in that the data collected can be used to develop innovative services, such as e-hailing services, new bus routes or specific road-tolls during periods of particularly heavy smog.
In this new digital-era where data is considered the “new gold”, stakeholders in the urban systems must develop new collaborations and agreements in order to share, sell, synthesize, mix and treat the tremendous amount of data produced. And, with this new age comes a whole new set of questions for the urban stakeholders: Who owns the data? To what extent can the data be purchased given that some of them might be considered private? Under which considerations should the data be considered private? How will the use of this data be regulated?

By using ICTs, more and more cities are branding themselves as so-called “Smart Cities”, but the use of ICTs in monitoring and service provision alone do not qualify a city as “Smart”. The concept of the “Smart City” concept also implies being smart, by, for example, developing mechanisms to incorporate citizen input into city decision-making processes (potentially using ICTs with online platforms, or complaint-apps), thereby incurring a shift from a government to a governance perspective.

Why Seoul?

Smart City, Digital City, Numeric City, Cyber City, Data City… the labels given to describe a city using ICTs to improve its performance are numerous and can sometimes sound hollow. Indeed, the concept has gradually evolved into a brand, pushing more and more cities to jump onto the Smart City bandwagon and thereby creating an unfounded competition between them.

With one of the highest rates of smartphone penetration worldwide, their impressive Internet speed, and with technology giants accounting for more than 50% of the national GDP, South Korea appears to be one of the most tech-oriented nations in the world. Accounting for about 50% of the national population, the Seoul Metropolitan Area has evolved into a living laboratory for the implementation of ICTs in the service provision sector. Thanks to their successful incorporation of ICTs and the cutting-edge transportation center TOPIS, the city is globally recognized as having one of the best transportation systems in the world.
Following their successes in the transportation sector, the city of Seoul has begun to develop ICTs to incorporate into other infrastructures such as water and energy and hopes to harness the potential of these ICTs to eventually integrate all of the infrastructures into one interconnected urban infrastructure system. Even though such integration could be facilitated by data integration, such a project raises a lot of questions in terms of governance and regulations - these topics were addressed at great length during this module. Special attention was also paid to developing an understanding of the role that the private sector, which is particularly powerful in South Korea, plays in the development and implementation of ICTs in urban service provision.

The city of Seoul has also implemented practices that demonstrate their desire to also be smart. Such examples as using ICTs to develop innovative ways to involve citizens in decision-making processes, making most of their data publicly available, and by also following practices consistent with the e-government era made Seoul an especially interesting city to study. Furthermore, in Seoul the concept of being smart was also translated into the development of urban regeneration projects and extensive urban green infrastructures. In our opinion, these examples embody the potential of ICTs as well as the concept of being smart through developing inclusive and participatory policies, thereby positioning Seoul as the closest approximation of a Smart City in existence.
Presenters for the Seoul Module

Experts from the Seoul Metropolitan Government, Transdev, Samsung, UN-Habitat, EPFL, and Experts from Seoul Metropolitan Government, the World Bank, UN Habitat, Citynet, KFEM, University of Hawaii, Tennessee State University, Incheon National University, Yonsei University, Malaysia Multimedia University, Sungkyunkwan University and EPFL were all present in this module to discuss “Smart” urban infrastructure governance and how it can make urban systems more efficient.

Topics covered

- Smart Cities
- Smart Mobility and Transportation Integration
- Smart Energy Systems
- Innovative Citizen Involvement Processes
- Governance of Innovation in Urban Contexts

Field Visit to the Mapo Recovery Facility
In September, the fifth module of the second edition of the IGLUS Executive Master took place between New York and Detroit. This module was organized by EPFL in collaboration with the City College of New York and Michigan State University and focused on the financial and economic dimensions that must be taken into account in order to make urban systems more sustainable.

One of the most prominent characteristics of urban systems is often regarded to be their dynamic nature. Cities and urban areas never reach a steady state, but are constantly expanding, developing, or declining. Urban managers strive to guarantee a certain quality of life for their citizens, and in order to do this, they must be able to cope with the uncertainties associated with the city’s dynamics and make sure all parts of their urban systems are properly functioning irrespective of the state of the city.
The manner in which a city has been designed and has developed is closely linked to its ability to bounce back following a disturbance (be it financial, environmental...). The main challenges impeding a city’s ability to rebound after a period of decline are rooted in the creation of innovative financing mechanisms and bringing in actors from different horizons - not only the public sector.

Although typically synonymous with hard times, urban decay and decline should be understood by city managers as opportunities to improve their cities and come back stronger. By traveling to two cities that have dealt with urban decline at different periods, in this module, we aimed to understand the different strategies employed to help a city to rebound from decline through a process of sustainable renewal.

Why Detroit - Chicago?

Recently, the Brookings Institution, A.T Kearney, the United Nations and the Economist all positioned the city of New York within the top 3 in their annual global cities rankings. However, such statuses have not always been associated with New York City. It was only thanks to several decades of relentless work by different city administrations that the United States’ most populous city managed to come back from the brink of bankruptcy.

But how did they manage to rebound from such a dire situation, and at what cost? To answer these questions, we studied the transportation and green infrastructures in the city (such as the High Line in Chelsea and the Line 7 extension on the subway) and tried to understand the extent to which they contributed to the city’s regeneration and whether sustainability criterion were considered during the development process.

On the other hand, Detroit, the very first case of large urban system bankruptcy that has become world famous. Home to over one and a half million inhabitants in the 1960’s, after filing for bankruptcy in 2013, the population of Michigan’s biggest city has fallen drastically to just over seven hundred thousand people, constituting a unique case for the study of urban decay and decline. Such a situation prompts many different questions: How do we manage and govern a city that expanded without limits and then rapidly lost two thirds of its population? How can we redevelop a city that has undergone such severe economic collapse and make it function again? Where do sustainability policies stand in the redevelopment of such urban systems?
During our stay in Detroit, more commonly known as the “Motor City”, we were able to study one of the best examples of collapse in a path-dependent system in order to try to understand the underlying reasons for the city’s decline and in turn the shortcomings of the American Dream.

Bottom-up initiatives are currently popping up and are attempting to bring Detroit back to its former glory. But among these many diverse initiatives, we must coordinate a single, realistic political vision if we wish to realize this objective; the question that stands to be answered is how.

By visiting both cities we were exposed to two unique and contrasting perspectives that allowed us to compare a city that nearly collapsed and has since re-stabilized, with another city that recently collapsed and is hoping for solutions to a brighter future.
IGLUS Global Training Series

Presenters of the IGLUS Detroit - Chicago Module

Experts from EPFL, the Regional Planning Association, Michigan State University, the City College of New York, Michigan State University, Wayne State University, NYMTC, Detroit Economic Growth Corporation, Greening of Detroit, the World Bank and NYU were present in the module to address topics related to how to govern urban infrastructure systems in economic decline in order to help them to bounce back better and include sustainability objectives.

Topics covered

- Infrastructure System financing
- Municipal Bankruptcy
- Abandoned Asset Management
- Urban Sustainability

The abandoned Packard Plant in Detroit: from decline to renewal
In November 2016, the final module of the second edition of the IGLUS Executive Master took place in Dortmund and Barcelona. The module was jointly organized by EPFL, Technical University of Dortmund (TuD) and Polytechnic University of Catalunya (UPC), and focused on metropolitan governance structures and tools for developing economic resilience in urban areas.

Over the last decades, the phenomena of urbanization has been recognized all over the world and its motivations, effects and proper management have been discussed at great length. Interestingly, although commonly associated with urbanization, the concept of metropolitanization has been commonly overlooked. Cities have been expanding at unprecedented rates since the middle of the twentieth century so that today more than half of the global population live in urban areas. But, what has been overshadowed by these numbers, is the fact that in most cases, these “cities” have extended beyond their historical administrative boundaries, forming massive agglomerations by engulfing neighbouring municipalities and agricultural lands. Cities that were once defined as “big” are now considered metropolitan areas: urban regions that cannot be considered in isolation, but, because of the strong links between them and their surrounding territories, must be seen as the sum of the agglomerated pieces. In such contexts, as the traditional concept of city is gradually giving way to metropolitan regions, traditional practices for managing and governing urban infrastructures are no longer applicable.
**Why Dortmund and Barcelona?**

What is the most populated urban region in Germany? Those of us who would have answered Berlin or Frankfurt would be wrong. Few would have thought the Ruhr region in North Rhine Westphalia to be the most populated area in the country, and this is specifically the reason that motivated us to choose to travel to Dortmund to study metropolitan governance.

The Ruhr region is possibly one of the most fragmented regions in Europe with no city really distinguishing itself from others economically or by population size. The Ruhr area is also one of the most polycentric areas in western Europe forming a single economic region, resulting from close geographical and institutional ties between a multitude of smaller municipalities.

The area has also suffered from deindustrialization, and because of this the Ruhr region is slowly trying to renew itself by calling for more cooperation between its municipalities. By adopting a horizontal, bottom-up approach to cooperation, municipalities in the Ruhr succeed in working together without losing their political or social identities. Many successful projects can be observed in the Ruhr region, most notably the development of Green and human-powered mobility at the metropolitan scale.
Barcelona, on the other hand, can be seen as a monocentric metropolitan region, with an established metropolitan governance structure that is strongly supported by the city of Barcelona and tries to include some of the surrounding municipalities. But are all municipalities of the functional metropolitan region included? If not, why? What conflicts can arise during the development and implementation of urban projects at the metropolitan scale? Even though the subject of metropolitan governance has been on the table for decades in the region, there is still a long way to go before the region will have an established functional metropolitan organization that could reduce redundancy between sectors.

Both urban systems have suffered from deindustrialization, but underwent a renewal process by servicing and developing insightful brownfield restoration projects.
Participants discussing their ideas and conceptualizing smart cities

Presenters in the IGLUS-Dortmund-Barcelona module

Experts from TuD, EPFL, UPC, Wuppertal Institute, Innoz, UN-Habitat, IBM, Ecologia Urbana de Barcelona, Barcelona Regional, Bicicultura and CLES were present in the module to discuss the challenges that need to be overcome before successful metropolitan governance schemes can be designed, as well as strategies for the redevelopment of post-industrial regions and achieving economic resilience.

Topics covered

- Institutional Design for the Governance of Polycentric and Monocentric Metropolitan Regions
- Economic Resilience
- Green Infrastructures and Soft-Mobility
- Public and Private Service Provision
Participants Testimonials

Yannis Evmolpidis
Athens, Greece

Master in Urban Planning
Advisor to the mayor of Athens

“IGLUS is a very innovative executive master’s program, which brings together professionals from a wide variety of backgrounds. The program is structured in a country- and topic- specific way, addressing the major urban issues of each metropolitan city. Each module provides a unique perspective on urban development combining theory with practice. Participation of major international firms and institutions also offers a practical approach to issues with real life solutions.”

Abdulsalam Alshehhi
Ras al Khaimah, UAE

Bachelor of Electrical Engineering
Electrical Engineer

“I have been looking for such a program for a long time. Since I am not an urban planning major, I wanted to gain more knowledge about urban management and governance, but most programs offered require semesters of attendance, which would affect my job. The IGLUS program was the cutting edge program that I wanted. I think that the content of the program covers all aspects of urban management. I really appreciate the way the program has been designed.”
“IGLUS is a unique program that brings all the dimensions of urban systems together to provide comprehensive solutions to build and manage our cities better. The program is structured in a way that you learn from both theories and practice, from high level academics and practitioners, differently in each module, since each of the modules focuses on a specific urban challenge. This program is made for you if you are interested in providing innovative solutions to make our cities a better place to live in.”

Noora Ali Mohamed
Manama, Bahrain
Bachelor of Civil Engineering
Senior Engineer at the Ministry of Transportation and Telecommunications

“After attending my first module in Seoul, June 2016, I can say that IGLUS Master is a great tool to find out and to learn about several subjects (financing, transportation, water, waste, governance, participation…) managed at a large scale and faced from public and private sectors points of view. Challenges for the present, and of course, for the future, are taught by excellent lecturers in an amazing interdisciplinary academic atmosphere that encourages participation with the students.”

Jesus Rabanal Torres
Madrid, Spain
Law degree
Legal Advisor to the Department of Traffic and Mobility in Madrid City Hall
Lecturer Testimonials

Prof. Jerry Kolo
Professor of Urban Planning
American University of Sharjah

“In a world where large and complex urban systems knit humans and their environment in an inextricable relationship, IGLUS is uniquely designed to train professionals who can manage this relationship effectively by engaging trainees in pragmatic research, seminars and exercises that challenge them to think critically and innovatively through situations and scenarios where the foremost constant is uncertainty.”

Dr. Christoph Rothballer
Expert Principal
The Boston Consulting Group

“I have been teaching for two years in the IGLUS Executive Master, both in Istanbul and Dubai modules on Public Private Partnerships and optimization of existing transportation infrastructures. The IGLUS way of teaching city-level public managers in all kind of aspects on how to make their cities smarter, more sustainable, more livable and financially sound is something that I particularly enjoy. The lively discussions with students who bring in their own practical experience, diverse backgrounds and own pressing real life questions add much to the learning experience, for both lecturers and participants.”
“It was a great pleasure to teach in the IGLUS Istanbul module. IGLUS is a program with students from all over the world who are motivated to learn. The students came with a breadth of background experience that made for rich and cross-cultural exploration of urban governance issues and challenges.”

Prof. Aybike Ongel
Professor of Transportation Engineering
Ticaret University, Istanbul

“I had the pleasure to teach about Smart cities in the IGLUS master class. Students’ interest was very big and I highly appreciated the intensive interaction with the students. They participated intensively with their own experiences and it was very interesting for the class as well as for me to learn about the different challenges and solutions in their cities.”

Norbert Ender
Smart City Leader
IBM
Sustainability, Resilience and Efficiency are fundamental considerations for urban infrastructure managers. The dramatic increase in urban populations will inevitably increase demands for energy, mobility, water, and other urban services in every city around the world. Without functional governance and management structures that ensure performance in cities, the ongoing urban growth could become a catastrophic risk threatening humanity’s quality of life.

Developing management practices that effectively integrate the processes of urban planning with urban infrastructure planning and management is a challenging task with which many cities are currently struggling, but such practices are a must if we hope to transform cities into sustainable and resilient engines of growth in both developing and developed economies.

Within this context, we have developed our first MOOC Management of Urban Infrastructures, on the Coursera platform, in order to provide our learners with the basic principles of urban infrastructure management that are fundamental for building prosperous cities that are sustainable, resilient and efficient. Thanks to our IGLUS partners, the course brings together academics and urban practitioners, to give insights from different perspectives and an interdisciplinary point of view on how to manage urban infrastructures.

After providing a general introduction on the management of urban infrastructure, the course focuses on the management of urban mobility and urban electricity systems.

With over 8000 participants and over 99% of satisfaction from our learners, we believe to have started to pave the way for more online education regarding the management of urban infrastructure to make our cities better.

Given the success of our first MOOC, we are very happy to announce that our second MOOC: Smart Cities – Management of Smart Urban Infrastructures is now on the way. Stay tuned!
MOOC Testimonials

Ashley Christine Pilipszyn
Chicago, USA
Co-Founder & Managing Director of SHAREnergy.world

“This MOOC was one of my best experiences with online education and had great content that applied a holistic systems approach to urban infrastructure management. What I valued the most were the high-level guest lecturers at the end of each Block who gave an insight on their real-world application of the core competencies taught in each block.”

Piotr Walas
Lodz, Poland
Consultant in WMW Projekt s.c.
Town planning company in Poland

“I found the MOOC in Managing Urban Infrastructures to be very well-balanced in theory and practice. Moreover, I particularly appreciated the case studies that presented problems and challenges faced by various cities in interesting ways. I believe the course was stimulating and will be enriching for my further professional development.”

Nicolò Alessandri
Treviso, Italy
Architect at Sixplus Architetti (Italy)

“This course has offered me a very clear and easy introduction to the principles of management of Urban Infrastructure systems and it has enabled me to acquire significant skills in this field as well as a large vision of the issues, and helped me start thinking critically. This course has been a great starting point for me on my willingness to reorient my career, thanks to a very strong and powerful staff behind it who were always ready to help you and give you the support that you need.”
Management of Energy and Sustainability (MES): Master Student Semester Projects

As part of their coursework, the Master Students in Energy Management and Sustainability at EPFL were required to complete a semester assignment within the scope of the IGLUS project. Since the beginning of the IGLUS era, we have supervised 16 semester projects and one Master thesis. Our Master students have produced primarily qualitative research, which have provided us with a lot of interesting work related to the innovative governance of urban infrastructures. Some of these projects have served as a basis for scientific publication. In the hopes of providing you insight into the student’s involvement, here a few samples of their projects:

Regulatory Adaptation to Disruptive ICT Mobility Modes: The cases of São Paulo and Rio de Janeiro

Catarina Amarante, Arnaud Besse Cillier, Niccolo Ficcarelli, Theophile Verhnes

The advent of the sharing economy and the use of information and communication technologies (ICTs) has created an extensive body of research on the topics of ICTs, urban mobility, urban governance, ICT disruption and transport regulation. However, a significant research gap exists in the study of regulations of ICT-based urban services, and more specifically on e-hailing regulation. As such, this paper aims to address this gap through a descriptive and analytical case study of the adaptation of regulatory frameworks to the entrance of e-hailing services (UBER) in Rio de Janeiro and São Paulo, in Brazil. These two cities, while geographically and demographically similar, have taken opposite stances on UBER regulation, with São Paulo pushing for integration and Rio de Janeiro pushing for banishment. Our main findings concern the steering power of UBER in determining outcomes favorable to them and their power to reject almost any outcome, which does not fit their business strategy. It also concerns the possibility to find solutions that integrate e-hailing within the overall city mobility, fostering cooperation between services rather than competition. Overall, the paper sheds light on how two similar cities have taken opposite approaches to the regulation of UBER, and attempted to analyze the merits of each approach, their expected outcomes, and the future outlooks of e-hailing regulation in the long-term.
Innovative Transportation ticketing Systems: The introduction of EMV Payment Cards in London Transportation Systems

Catarina Amarante, Arnaud Besse Cillier, Niccolo Ficcarelli, Theophile Verhnes

Information and Communication Technologies (ICTs) have for the last decade impacted most aspects of urban transportation systems. One of the most promising dimensions of ICTs has been their ability to enable new forms of integration among various transportation modes and mobility providers, thus making public transportation more convenient and inclusive for its users, as well as a stronger candidate to enhance the shift from private car use to more shared transportation modes, which is critical for achieving resource efficiency, economic growth and well-being of urban dwellers.

Famous around the world for its pioneering introduction of the smart transportation “Oyster” Card in 2003, the City of London re-innovated the system once again in 2014 by introducing a new integrated ticketing system. Thanks to the installation of RFID technology on most modern credit cards, Londoners are now allowed to use their EMV contactless credit cards as transportation cards in all buses and subways in the London urban transportation system, thus deleting the need to carry multiple cards, reducing waiting times at oyster charging terminals, and ultimately improving the efficiency of the overall transportation system.

In this paper, we present the case of the integrated EMV contactless payment card development and implementation in the London Transportation System by focusing on the roles played by each of the key stakeholders involved in the project, and analyze it in terms of winning/losing stakeholders.
Past Workshops

The following workshops were a critical part of our activities last year. The interaction among participants makes us especially proud of this success. Our most recent workshop was held in February 2015, in Ras-al-Khaimah in the United Arab Emirates and was co-organized with EPFL, Middle-East. We discussed the governance of large urban infrastructures as socio-technical systems with the 15 international academics that attended the workshop.

**International Forum on Metropolitan Governance Innovation**

Guadalajara, Mexico, November 23rd & 24th 2015
Round Table: Challenges for Metropolitan Mobility

This world class event presented participants with the opportunity to learn about and discuss different initiatives related to metropolitan governance that are in place in cities around the world. The main goal of the event was to understand the best practices being used in Metropolitan Governance and to discuss the main actions that must be taken.

One of the most urgent topics in metropolitan coordination is mobility. In most cases, for services that cross municipal boundaries, the management and development of public transportation infrastructures are still the responsibility of the state. In this context, the primary challenge is to establish a governance system composed of authorities and transportation companies, where the necessities and interests of the municipalities are served. With experts from the field, we presented the concept of Mobility-as-a-Service and its potential outcomes, and we also demonstrated the potential solutions it could provide for our cities as well as what should be done from a governance point of view to ensure success.
Can North–made IOT solutions address the challenges of emerging cities in the South? The case of Korean born Smart transportation card implementation in Bogotá

2016 UNESCO Chair Conference on Technologies for Development: From Innovation to Social Impact

Maxime Audouin, Mohamad Razaghi, Matthias Finger

Currently, many northern cities use Internet of Things (IoT) solutions for answering urban challenges, but there are certain doubts about their transferability to southern cities. This paper aims at studying the transferability of IoT solutions from the urban north to the urban south. The impacts of one prominent example of IoT solutions in urban transportation sector is first discussed, by presenting the ability of Seoul to manage the complexity of its public transportation system with the introduction of a Smart Transportation card. Then, the key factors that enabled Bogotá to benefit from the same technology, originally designed for Seoul, are analyzed. This case study sheds more light on the impact of IoT solutions for cities, which usually have origins in the north, on addressing the challenges of the urban south and reaching the development goals.

Cognitive Cities: Advances in Cognitive Computing and its Application to the Governance of Large Urban Systems

Edy Portmann & Matthias Finger (editors)
Springer New York

This book introduces the readers to the new concept of cognitive cities. It demonstrates why cities need to become cognitive and, therefore why, a concept of cognitive city is needed. Following a concise introductory chapter, the book features nine chapters illustrating various aspects and dimensions of cognitive cities. All chapters offer a comprehensive view of the different research endeavors about cognitive cities and will help pave the way for this new and innovative approach to governing cities in the future.
Conceptualizing Smart Cities

Matthias Finger & Mohamad Razaghi
M. Informatik Spektrum

“Smart City” has become a buzzword. Much is being written about smart cities as we speak, most of it promotional and uncritical. The goal of this article is not to criticize smart cities, nor is it to promote them but to make a contribution to the conceptualization of smart cities and, by doing so, help to make the concept more intellectually concrete. This paper also contributes to developing a more realistic and ultimately more practical view of what smart cities can achieve... and what they cannot.

GIpc Quarterly

Volume 2, Issue 1: Multi-level Governance in the Urban Context

Our first issue of 2016 includes four articles dealing with very different aspects of urban infrastructure governance, but all are related by the common thread of collaboration between the actors at different levels and stakeholder engagement. In this issue of GIpc, the multi-level institutional framework underlying water resource management in Mexico, brownfield redevelopment programs in Germany, a Carbon Abatement Strategy in the UAE, and citizen engagement in Mexico are discussed.

Volume 2, Issue 2: Insights from the Rhine-Ruhr Area

The second issue published in 2016 was a Special Edition of the GIpc Analytical Bulletin and was dedicated to insights from our IGLUS partners in Dortmund, Germany. In a series of three articles, the authors investigate three different dimensions of large urban systems in the Ruhr region and beyond: green infrastructures, metropolitan governance, and smart cities.


In cities all over the world urban congestion, pollution and travel times are as the use of personal motor vehicles (PMV) continues to exceed the city’s urban infrastructure capacities. In final edition of 2016, we travel to Vancouver, Mexico City, Istanbul and the USA to see how alternative modes of transport are influencing PMV usage on city roads.
We would like to thank our partners for their participation and continuous support of IGLUS. Their presence next to us is greatly appreciated. From all the corners of the world, they have always made our journey more than enjoyable.