

The IGLUS Yearbook

2015

iglus

INNOVATIVE GOVERNANCE
OF LARGE URBAN SYSTEMS



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

iglus.org
iglus@epfl.ch
facebook.com/IGLUS.EPFL
twitter.com/IGLUSEPFL

Odyssea 215, Station 5
CH-1015 Lausanne

Tel: +41 (0)21 693 00 03
Fax: +41 (0)21 693 00 80

Text: Prof. Matthias Finger, Mohamad Razaghi, Maxime Audouin
Editor: Rebecca Himsl
Design: Cyril Wendl
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The IGLUS Journey

Thank you for your interest in our IGLUS project! In this 2015 edition of the IGLUS Yearbook we would like to share our first “IGLUS journey” with you. As you will see, our action-research journey has taken us to seven exciting locations, where we were able to learn unique lessons within the context of large urban infrastructure system governance. I hereby would like to thank our university partners in these seven cities for having organized our modules and for having provided such invaluable insights to our participants. I would also like to thank our international institutional partners and our global industry partners for having so kindly offered their teachings. Finally, I would like to thank our participants for their active involvement and contributions towards our collective learning endeavor. We hope that this first Yearbook will contribute to sharing our vision and our passion for what we think are among the greatest challenges today, namely the management and the governance of the urban infrastructure systems, so as to make our increasingly global cities more efficient, more sustainable, more resilient and ultimately better prepared for their futures. As we have already started our second global IGLUS journey, we look forward to welcoming you as a part of our IGLUS community.

Prof. Matthias Finger
Head of the IGLUS project



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 2014-2015

7 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.

More than **100 lecturers** (from academia, cities, industry and international organizations) have partaken in the training events.

47 participants attended at least one of the IGLUS training modules.

14 nationalities were present in the IGLUS training modules: Mexico, Columbia, Brazil, Ecuador, Venezuela, China, India, Turkey, Iran, UAE, Bahrain, Greece, France, Russia

16 participants were officially registered in the IGLUS Executive Master Program.

The average age of the participants in the IGLUS Executive Master is **37**.

97% of the training sessions were rated good or very good by the participants.

The IGLUS Team

The people who made IGLUS happen over the course of the past year are numerous. IGLUS is an interdisciplinary project, as affirmed by the diverse background of its members. The professors are a very precious asset of IGLUS. But we have also grown thanks to the help of the EPFL MIR Chair PhD candidates, and of some of the EPFL Energy Management and Sustainability Master students who have joined the project through semester projects, as part of their coursework.

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-Programme 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. Daniel Carrasco

Prof. Daniel Carrasco holds a PhD in Political Science from Science-Po Grenoble and is a full Professor at the business school of Tecnológico de Monterrey in Guadalajara, Mexico. He is focused on participatory governance, citizen empowerment and comparative policy analysis.



Prof. Edy Portman



Prof. Edy Portmann is a researcher, specialist and consultant for semantic search, social media, and soft computing. He was a Visiting Research Scholar at National University of Singapore (NUS), as well as a Postdoctoral Researcher at University of California at Berkeley, USA. At present, he is working as an Assistant Professor of information science at the University of Bern, Switzerland.

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. Murat Güvenç



Born in Ankara, Prof. Güvenç graduated from the Department of City and Regional Planning of Middle East Technical University in 1976. He received his Master's Degree in 1979. Professor Güvenç has taught undergraduate and graduate courses on Urban Geography, Urban Sociology, Planning Theory, Migration, Methodology, in Middle East Technical University, Istanbul Bilgi University, Istanbul Şehir and Bosphorous Universities. His academic interests concentrate on intra-metropolitan industrial geography, urban history and data visualization.

Dr. Mo Mansouri

Since 2008, Dr. Mo Mansouri is an Assistant Professor in the School of Systems and Enterprises (SSE) at Stevens Institute of Technology. He holds a Bachelor's degree from Sharif University of Technology, a Master's degree from the University of Tehran in Industrial Engineering, and a Doctor of Science in Engineering Management from The George Washington University. He currently conducts research in the realm of governance studies and analytics, which focuses on the decision rights and share of authority over resources among the stakeholders based on the dynamics of relationships and nature of transactions within network environments such as network industries and organizations.



PhD Candidates

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 is writing 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.



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.

Staff

Cyril Wendl



Cyril Wendl 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 is currently studying Environmental Sciences and Engineering at EPFL. He has been actively committed as a co-founder and President of the Student Organisation for Sustainability at the University of Fribourg (NEUF), and has initiated the Bike2University competition. He is keenly interested in informatics and sustainability issues.

Global Training Series

The IGLUS Global Training Series was the core of the IGLUS activities throughout our first year of existence. It illustrates how we have defined ourselves as an action-research project. Throughout these training series, we have invited academics, urban practitioners and city professionals to come and lecture in front of participants in the Executive Master program. Everyone around the table was invited to share his or her personal and professional experiences. Throughout these training series, we have understood the importance of sharing ideas and debate with respect to urban governance. With inputs from professionals in different fields, discussions have been very enriching and have allowed us to refine our analytical tools and our understandings of the city as a system.

Through these series, we have travelled around the world to seven very different locations. Moving from Istanbul to Hong Kong, from Dubai to Chicago-Detroit and finally to Seoul and Dortmund (Rhine-Ruhr region in Germany). These training series have allowed us to get to know different cases and to benefit from them for our research. Every country has its story, and every country has its concerns, especially when it comes to the urban landscape. In the following section, we will give a quick overview about the past training series. The map below shows the modules we organized in 2015. Hong Kong will not be continued in 2016.



The Guadalajara Module



The 11-day Training Module in Guadalajara took place in June 2014, and was the first module out of the seven IGLUS Global Training Series. This module was organized by EPFL in collaboration with Tecnológico de Monterrey, Guadalajara campus. In this training module, 17 participants attended 2 weeks of intense training aimed at understanding how social challenges affect, and are affected, by governance systems.

Why Guadalajara?



Sustainable Mobility in Mexico

Most cities in the world are currently facing social challenges including security, poverty and widening social gaps. In the Republic of Mexico many cities, most notably the Guadalajara Metropolitan area, have been suffering from these challenges over the course of the past two decades. Especially over the last ten years, the city center of Guadalajara Metropolitan area has been undergoing a consistent population decline, meanwhile the number of gated communities has continued to increase dramatically throughout the country.

For this eleven-day training event, experts from all over the world gathered in the Guadalajara Metropolitan area, a city where dealing with social challenges has become an indispensable element of governance processes at all levels. The best practices to deal with these challenges were discussed in the training sessions and several showcases from successful and failed initiatives were presented to our audience.

Presenters for the IGLUS Guadalajara Module

Experts from the World Bank, UN-Habitat, EPFL Switzerland, Tec de Monterrey, Metropolitan Planning Institute, SITEUR (operator of light rail in GAM), and well-known practitioners from Mexico presented in the Guadalajara Training Module.

Topics covered in the IGLUS Guadalajara Module

- Accountability and transparency initiatives in Mexican Municipal governments
- Integrated transport planning
- Metropolitan planning
- Housing profiling methodology by UN-Habitat
- Urban crime and violence prevention
- Social entrepreneurship as a tool to address urban challenges

Participants in the IGLUS-GDL module benefited from both theoretical inputs as well as practice-oriented insights in order to gain the knowledge necessary to resolve the social challenges in governance of large urban systems.



Discussions during the Guadalajara Module

The Istanbul Module



Citizens' memories and habits are shaped by their interactions with the living environment, (i.e., their city). Cities with long histories and strong identities thus evoke strong memories and meanings for their citizens.

However, not all of these city-citizen ties can be preserved indefinitely. In age of urbanization, characterized by densely populated neighbourhoods, scarce resources, new technological possibilities and environmental challenges, cities are no longer able to function in their conventional ways.

Urban renewal projects are ultimately aimed at improving the quality of life in cities, and the urban renewal process inevitably alters the way that cities (sometimes with thousands of years of history) function, and will inevitably interfere with the habits and memories of citizens. Urban renewal projects are typical examples of when the necessity for re-organizing the city's infrastructure and the



Visit of Istanbul University

unwillingness of the habitants to change conflict. This can result, and has repeatedly resulted, in the emergence of opposition from social groups towards certain projects, in the social exclusion of vulnerable groups after the implementation of a project, and in the deterioration of the socio-cultural balance in the city, which in turn can lead to a sense of identity loss for the city and result in violence, a lack of trust and deterioration of social capital within the city. When an urban renewal

project goes further than only reconstructing an old building and aims at positing a historic city as a global hub, the changes will be even more drastic, and thus so too will be the challenges.

Urban renewal projects are sometimes halted due to such oppositions and concerns regarding their consequences. The final outcome of the project thus becomes an over-cost and over-time endeavor. In such cases, the project doesn't finish on time and is completed at below-acceptable quality, which further burdens the city, city governors and citizens with significant economic, social political and environmental costs.

The 11-day Istanbul training module focused on governance through urban transitions and governance of socio-cultural challenges.

Why Istanbul?

Istanbul is a city with more than 1600 years of urban history, over which culture, tradition and religion have become deeply embedded in the city's DNA. This is why in 2010 Istanbul was elected the European Capital of Culture. Contrastingly, because its ambitious visions to make Istanbul a world-class city with skyscrapers, world-class airports, iconic bridges, complex transportation networks (ferries, bus, metro, taxi, and trams), highways and parks, the city also exemplifies a more modern Turkey.

Istanbul has gone through a process of urban renewal that is still evolving at a rapid pace. Due to its rich history, renewal projects have always faced sociocultural opposition and conflict (Gezi Park project is a recent example). Hence, Istanbul is the ideal location to learn about challenges associated with urban renewal and infrastructure modernization, and to also explore how innovative governance solutions could help cities overcome these challenging obstacles.



Istanbul Disaster Management Center

Experts from all over the world were gathered in Istanbul for this 11-day training event from the IGLUS Global Training Series.

Presenters of the IGLUS Istanbul Module

In the Istanbul Training Module, experts from the UN-Habitat, EPFL, Bahcesehir University, Istanbul University, Yildiz Technical University, UITP, BCG, Schneider Electric, Soyok construction company, IETT, Istanbul Metropolitan Planning Institute, and the deputy mayors of four municipalities in Istanbul, as well as well-known practitioners who have been previously involved in developing efficient governance strategies in Turkey were all present.

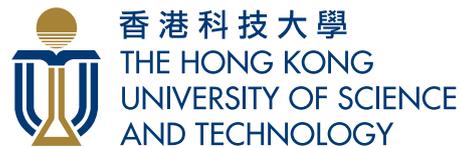
Through this module, these diverse, experienced professionals gathered to discuss issues related to the governance of urban renewal projects, the modernization of urban infrastructures (i.e. transportation, greens, and construction), and urban resilience.

Topics covered in the IGLUS Istanbul Module

- Governance of socio-cultural conflicts in urban renewal projects
- Protection of cultural assets and social capital in the modernization process
- Risk management in urban renewal projects
- Financing and governance of public transportation projects in megacities
- Governance of green infrastructures and urban ecosystems
- Operation and maintenance of large public transport systems and use of ITCs in these systems
- Theory of governance from a technocratic point of view
- Smart energy systems
- Evolution of metropolitan governance in Turkey

Participants in the workshops benefited from both theoretical input and practice-oriented insights to assist them in resolving the challenges facing governance throughout the complex process of urban renewal.

The Hong Kong Module



Our global populations are becoming consistently more urban, and this trend towards urbanization is especially strong in Asia. Most mega cities are already located in Asia and numbers are expected to only increase in the future.

Large cities, especially those that are densely populated, make it possible to achieve economies of scale and system optimization for the provision of urban services to a large part of the population (i.e. mobility and transport, energy, water, etc.), and based on the performance gain argument, international organizations, well-known scholars and practitioners are now advocating for increasing population densities within cities.

However, it is a demanding task to reconcile the three fundamental goals of urban infrastructure managers: providing high quality services to a demanding middle class, preventing segregation



IGLUS sessions in HKUST campus

between the poor in slums and the rich in skyscrapers, and realizing the vision of sustainable development. Besides, providing urban services in large cities has additional, unique complexities in terms of the design and operation of infrastructures.

The integration of urban systems brings valuable opportunities to achieve performance gains for the provision of services to urban dwellers. Yet, there is a substantial difference between the

idea of creating integrated systems and the actual realization of such systems. The integration of a city's infrastructures requires a high level of local technical know-how, as well as governance and coordination capabilities.

The 11-day Hong Kong Training Module that took place November 2014 was organized by EPFL in collaboration with Hong Kong University of Science and Technology. Twenty participants attended this intense 2-week training program, which was aimed at understanding how Hong Kong could succeed in bringing a high level of integration to the planning and operations of urban infrastructures.

Why Hong Kong?



Visit from sustainability initiatives of HK airport

Hong Kong is an exemplary city in terms of its ability to provide high quality services to its large urban population. The city has a globally reputable transportation system and is usually taken as a case study to showcase the potential efficiency gains made available by opting for a vertical growth strategy when accompanied by an integrated public transport system. Hong Kong is also amongst the pioneers to use ICTs for improving the quality of service provision for citizens.

During this 11-day training event, experts from all over the world gathered in Hong Kong, a city where technical and governance challenges related to the integration and optimization of urban infrastructure systems have been recognized and tackled in the real-world. The best practices for innovative governance in the face of such challenges were discussed and participants had the opportunity to learn more about the governance of other cities in Mainland China, Taipei, Vietnam and Thailand and to compare them to each other.

During this 11-day training event, experts from all over the world gathered in Hong Kong, a city where technical and governance challenges related to the integration and optimization of urban infrastructure systems have

Presenters of the IGLUS Hong Kong Module

In the Hong Kong training module, we had experts from the World Bank, UN-Habitat, EPFL, Hong Kong University of Science and Technology (HKUST), MTR (operator of metro system in HK), Transdev (operator of tramways in HK) and well-known practitioners who have been involved in the design and operation of huge infrastructure systems in Hong Kong and Chinese cities.

All of these professionals discussed the governance of integrated urban infrastructure systems and the challenges to be faced in the optimization of integrated systems.



Welcome session in HKUST

Topics covered in the IGLUS Hong Kong module

- Energy policy for sustainable cities
- Smart city and the challenge of big data
- Integrated water and waste treatment systems
- Integrated transport systems
- Metropolitan finance
- Housing market dynamic and housing profiling methodology by UN-Habitat
- Urban resilience

Participants in the IGLUS-HK Module benefited from theoretical as well as practice-oriented insights into resolving challenges related to the governance of integrated urban systems.





The Dubai - Sharjah Module



In the future, an increasing number of people are expected to migrate towards urban centers, which raises an important concern: where will this growing urban population be absorbed? Will they settle in existing mega cities, in new cities, or in ever-expanding medium-sized urban centers?

Statistical projections indicate that the majority of this new urbanized population will be hosted in existing small- to medium- sized cities, begging the questions: how can innovative governance serve to achieve 'sustainable' growth, and more specifically, what are the implications of rapid urban growth for the governance of urban infrastructures?

Urban population growth will inevitably increase demand for basic urban services such as housing, mobility, energy, clean water, waste treatment, and green areas. Increasing the efficiency and/or capacity of existing infrastructures through infrastructural development could satisfy this demand. Another significant governance challenge is presented when the temporal element is considered, namely shifting demands for basic urban services.



Visit from the Masdar City

In medium-sized cities, migration is a major factor in population in growth. In contrast to normal population growth, which exhibits continuous and modest mortality and birth rates (a maximum of 5% per year), the increase in population size due to migration occurs at a very fast, and usually discontinuous pace. An important implication of which is that the demand for basic urban services can shift in irregular patterns over very short periods. On the other hand, new infrastructural development is usually very cost and time intensive, and once built, structures have long life cycles.

As such, cities often find themselves needing to urgently provide more (or, in rare cases, less) services for their growing populations. In order to accomplish this, they need to fill their infrastructure gaps quickly. However, time and budget place major constraints on their abilities to develop sufficient infrastructures to satisfy new demands. When facing such a challenging situation, how should cities modify infrastructural development to include a long-term planning perspective in order to ensure the 'sustainability' of the entire system? How can cities avoid becoming involved in firefighting to provide temporary remedies for increasing demands instead of thinking about the sustainable development of the city's infrastructure? What roles can technology and innovation play in tackling such challenges?

The two-week IGLUS Training Module in Sharjah-Dubai was held February 2015 in order to tackle these challenging questions. This was one of seven events in the IGLUS Global Training Series, and was organized by EPFL, Switzerland in collaboration with American University of Sharjah.

The aim of this two-week training program was to understand how cities can deal with the sustainability challenges they face with a special focus on the implications for governance of large urban infrastructures. The next IGLUS Training Module in the UAE is planned for February 2016.

Why Sharjah-Dubai?

Over the last 20 years, Dubai has experienced one of the highest rates of population growth in the world. The population of the Dubai metropolitan area (including Sharjah) has risen from 700,000 to 3,500,000 people over the past two decades, and the city has developed a very aggressive growth strategy for the coming



IGLUS sessions in AUS campus

years. Along with this rapid population growth, the city-emirate of Dubai and the neighboring Sharjah have also demonstrated impressive development in terms of the construction of buildings and other infrastructures such as metro lines, highways, and water desalination stations.

The city's achievements over the past two decades are impressive and undeniable, but some critics have questioned the sustainability of this rapid growth. For this IGLUS Global Training series, experts from around the world gathered at the American University of Sharjah during this two-week training event in Sharjah and Dubai. We chose Dubai and Sharjah for this module because these are among the best cases to illustrate how the demand for more infrastructures can be addressed and what the implications of rapid population growth for sustainability are.

In the IGLUS-Dubai event, we discussed the growth experience of Dubai and Sharjah, as well as the link between the governance of urban infrastructures and the sustainability challenges encountered throughout this rapid growth. Numerous interesting initiatives to develop and implement sustainability frameworks in other cities in the region were also discussed.

Presenters of the IGLUS Sharjah - Dubai Training Module

Experts from EPFL, American University of Sharjah, Masdar Institute of Technology, UN-Habitat, World Bank, Veolia, DEWA, BCG, ARUP and several officials from different governmental bodies were present at the Sharjah – Dubai Module, where they discussed governance in periods of rapid growth and the challenges associated with ensuring sustainable development practices.

Topics Covered in the IGLUS Sharjah - Dubai Module

- Systems thinking for urban managers
- Sustainability frameworks in the Middle East
- Water governance and green infrastructure
- Technological innovations in the energy sector (Masdar City Project)
- Waste management
- Housing markets and land use planning
- Planning support systems
- Urban branding and tourism
- Public-private partnerships
- Urban resilience profiling and assessment tools

Participants in the IGLUS-Dubai module benefited from theoretical input as well as practice-oriented insights in order to assist them in resolving the challenges related to the governance of sustainable development in periods of rapid growth.



Visit from the Beeah waste management facility in Sharjah



Urban Architecture in Dubai

The Detroit - Chicago Module

MICHIGAN STATE
UNIVERSITY

Detroit, like many other industrial cities in the United States, has been struggling with economic decline over the past few decades. Why is this decline happening? How can it be prevented from happening in other cities? How can these cities tackle the severe financial problems they face?

Cities need viable sources of wealth generation in order to continue delivering a high quality of services to their citizens. Industrialization was a major source of wealth generation, and many cities in the world have been developed around, or experienced a major growth period by hosting large industrial/manufacturing firms.

Nowadays, however, globalization and rapid urbanization are two of the main factors driving the de-industrialization of many cities around the globe. Globalization has led to the relocation of many manufacturing firms, previously anchored in metropolitan areas in Western countries, towards Asia and Latin America, in order to save costs. On the other hand, rapid urbanization has resulted in increasing demands for transport, energy, construction, clean water, and other basic urban services. This increasing demand for urban services can increase the level of pollution in cities as well as the demand for land and resources presently being consumed by industrial firms. Increasing pollution and competing demands for land (as well as water and energy) in cities can sometimes serve to push industrial firms outside the boundaries of large metropolitan areas.

Globalization and urbanization are two strong trends that seem unlikely to slow down in the near future. Therefore, it seems plausible to expect the de-industrialization of urban areas to continue. On the other hand, the demands for financing to improve the quality of services for citizens and to increase the attractiveness of the city for investors are also rising. The resulting question is how can these two seemingly dichotomous trends – an increasing demand for economic activities and a push for industrial activity to be relocated outside metropolitan areas – be reconciled in 21st century cities?

A decline in economic activities in a metropolitan area can make the area an unattractive place for working, living, and investing. This could cause the city's population to decline, urban infrastructures to become underutilized, and could result in less money being generated for the maintenance of existing infrastructures. Poor infrastructure and a lack of investment can continue to amplify these effects, making the place even more unappealing; this negative cycle can continue until the city experiences a massive drop in population or, in many cases, goes bankrupt and becomes heavily dependent on external financial resources in order to persist.

The 11-day IGLUS Training Module in Detroit / East Lansing / Chicago held April 2015 was one of seven modules in the IGLUS Global Training Series, organized by EPFL, Switzerland, and in collaboration with Michigan State University. The aim of this 11-day training program was to understand how cities could deal with the economic challenges they face, with a special focus on the implications for the governance of large urban infrastructures.

Why Detroit - Chicago?

“The city of Detroit, Michigan filed for bankruptcy on July 18, 2013. It is the largest municipal bankruptcy filing in U.S. history with debt estimated at \$18–20 billion.” ([Wikipedia](#))

American cities were among the first to face the challenges associated with de-industrialization, with Detroit being a particularly well-known case. Experts from around the world gathered in Detroit, a city that has suffered from economic challenges and is still struggling to settle its bankruptcy case, and Chicago, a city that could overcome the hard times associated with economic transition.

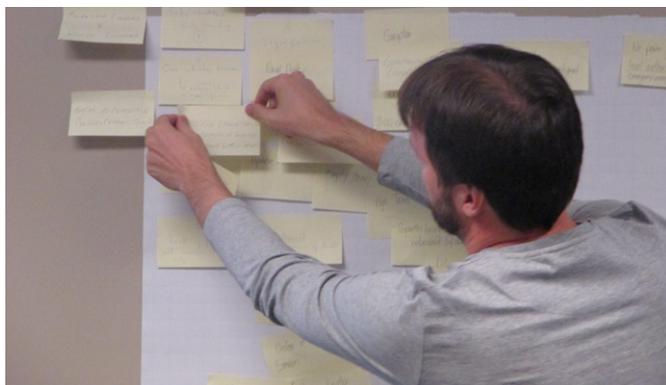


Field work in one of the parks in Detroit

In Detroit and Chicago, we discussed the best practices for innovative governance of economic challenges in large urban systems. Our participants had the opportunity to learn more about how American cities function, what their current challenges are, and what strategies are available to overcome these challenges.

Presenters of the IGLUS Detroit - Chicago Module

Experts from the World Bank, UN-Habitat, EPFL Switzerland, Michigan State University, Veolia, Transdev, Schneider Electric, and well-known practitioners working with American cities discussed the economic considerations associated with the governance of urban infrastructure systems and their respective challenges.



Workshop session during the IGLUS-Detroit module

Topics covered in the IGLUS Detroit – Chicago Module

- Urban economics and metropolitan finance mechanisms
- Economics of infrastructure
- Pricing and regulation of public utilities
- Brownfield reclamation in urban areas
- Urban leadership and community engagement
- Management of mega-projects in cities
- Urban resilience

The IGLUS-Chicago/Detroit Module provided multiple benefits to its participants both from a theoretical point of view and with practice-oriented insights in order to gain the knowledge necessary to resolve the various economic challenges that face the governance of large urban systems.



IGLUS sessions in MSU office in Detroit

The Seoul Module



It would be quite difficult to sum up all the characteristics of 21st-century cities with only one word. However, we believe “complexity” would be the best candidate to fulfill this task. Urban areas, traversed by a plethora of physical and immaterial flows, are continually increasing in complexity; a pattern that is further intensified by the megatrends shaping our century, such as urbanization, densification and, urban sprawl.

To facilitate the diffusion of these flows, cities are structured by urban networks (e.g. transportation, telecommunications, water and waste, energy) that produce huge quantities of data every second: the frequency of buses on a BRT system, the energy consumption of the streetlights over a given time period, or the amount of waste collected every hour by garbage trucks. In order to cope with this complexity that is defining urban areas, accessing and processing the data produced by the city infrastructure can be a good way to monitor things, maintain awareness of what needs to be tackled, and optimize the systems in order to improve living conditions in a city.

This is about making city components smarter so that they can acquire data, act on their own, and ultimately make the city smarter. For example, road sensors can measure pollution particle concentrations in the atmosphere, communicate with intelligent road gates that will directly adapt their toll fare in order to decrease the number of cars on the road and in doing so, improve air quality. In summary, making cities smarter seems to be an effective way to deal with most of the complexity encountered in urban systems, and to facilitate the transition towards greater efficiency and performance.

The necessary technology is already here: we know how to measure atmospheric pollution, and which automated algorithms to adopt in order to make driverless subways run. The problem remains in the implementation of such technologies and on the institutional changes needed to develop smarter solutions for smarter cities.

The two-week IGLUS Training Module in Seoul was held in June 2015 to tackle these challenging questions. This event was one of the seven IGLUS modules from the first edition of the program, and was organized by EPFL, Switzerland, in collaboration with Sungkyunkwan University, Seoul. The aim of this two-week training program was to understand how the governance changes that cities have to go through in order to implement technological innovations and create smarter mechanisms.



Cheonggyecheon restoration project from Seoul transportation control center room (topis)

Why Seoul?

With one of the highest rates of smart phone penetration in the world and world-class, cutting-edge ICT firms, Seoul has upheld its top ranking in the United Nations e-government survey since 2003. It has also launched a Smart Seoul program, which aims to make the Korean capital one of the smartest cities in the world.

With a wide array of projects already implemented, Seoul was the perfect candidate to gain a good insight into what can be done to make our cities smarter, and which institutional changes are needed to enhance technological innovations in an urban context.



Visit from Seoul Subway Line9 Operation center

Presenters for the Seoul Module

Experts from the Seoul Metropolitan Government, Transdev, Samsung, UN-Habitat, EPFL, and Sungkyunkwan University, as well as Korean experts from the Seoul Institute have discussed the governance of urban infrastructure systems that is required to develop and implement these beneficial technological innovations and to face the associated challenges.

Topics covered in Seoul Module

- Smart urban energy, mobility and water systems
- Urban ICT and policy governance
- Green performance (with deep insights into the Cheongyecheon restoration project)
- Mega urban project management (through case studies of the world cup and olympics that the city hosted over the last decades)

Participants in the IGLUS-Seoul Module benefited from theoretical input as well as practice-oriented insights to resolve the challenges related to governance for sustainable development in periods of rapid growth. Our next IGLUS module in Asia will be held in Seoul in June 2016.

The Rhine - Ruhr Module

Polycentricism seems to be the dominant pattern in metropolitan regions such as the Randstad in the Netherlands or the Rhine-Ruhr area in Germany. Compared to monocentric metropolitan regions such as the Greater Munich area or Hamburg, polycentric regions seem to have a disadvantage in attracting a high-skilled workforce because these regions (and the cities in these regions) lack transparency and a clear profile.

Nevertheless, polycentric regions seek to compete with the monocentric regions in Europe. In some polycentric metropolitan areas, several medium-sized cities adopt a cooperative strategy to balance this disadvantage and join forces. However, cities in metropolitan areas often cooperate and compete at the same time and this constitutes a problem for collaborative strategies.

Therefore, unlike monocentric city regions, (e.g. Munich, Paris or London) where a dominant, centrally-based alpha-metropolis is in a position to set the agenda, polycentric regions face greater challenges in creating a regional governance system, making them latently unstable and difficult to manage. This seems to confirm the well-known saying: "Good fences make good neighbors!"

On the other hand, polycentric metropolitan regions may have something to offer. The absence of a dominant core city results in a more balanced settlement structure with wide green spaces, a variety of options for leisure activities and places to live. In more theoretical terms, this can be described as functional differentiation that may result in synergies for metropolitan development. Still, metropolitan regions not only provide for a stronger political weight for the smaller municipalities, but are also assumed to

offer advantages regarding the cost-benefit ratios of agglomeration effects. The critical point to acknowledge is to what extent the region is able to organize its resources in a complementary way in order to ensure emergent effects. But can the virtues of polycentric metropolitan areas be realized? Does summing up small cities really make a metropolis?



Industrial heritage and green infrastructure at the Duisburg landscape park

Why Rhine-Ruhr Region?

The Rhine-Ruhr Region is an exemplary case to address these questions. It is one of the largest agglomerations in Europe, but displays a polycentric character without a clear dominant center and envelops many interior borders that divide the different cities. Political-administrative fragmentation hampers better coordination of planning and transport policies. The region is divided between the more prosperous south-west (Düsseldorf, Cologne) and the Ruhr area in the north-east that continues to struggle with the legacy of mining and steel production.

Another typical feature of this agglomeration is the great number of internal borders that separate settlement areas. These areas are further segregated by various land uses: industrial properties, areas used for storage and logistics, corridors and lines for energy supply and one of the regional green belts crossing the Ruhr agglomeration (what Christa Reicher calls “Ruhrbanism”).

A unique quality of the Ruhr region is the co-location of settlement areas, green spaces, rivers and waterways. Green spaces extend into the urban landscape everywhere within the region so that it is always possible to easily reach a nearby open park or woodland.

All throughout the region you can find meadows and forests, fields and gardens, which are used by the residents and noticeably shape the urban landscape. Including these urban greenspaces with the substantial number of public parks helps to illustrate the vast proportion of open space within the Ruhr region. In fact, many scholars consider the Ruhr region as a laboratory for the transformation of metropolitan areas.

Presenters of the IGLUS Rhine - Ruhr Module

The Rhine-Ruhr Module was hosted by the Faculty of Spatial Planning at the Technical University of Dortmund. Lecturers from academia and private and public organizations as well as practitioners discussed the challenges and solutions relating to the governance of polycentric metropolitan areas.

Topics covered in the IGLUS Rhine - Ruhr Module

- Institutional design of metropolitan governance
- Democratic quality of metropolitan governance
- Green infrastructure
- Mobility and transport
- Energy laboratories

Master Students Testimonials



Bertha Cuervas – Guadalajara, Mexico

Education: Bachelor in Statistics and Systems
Diploma certificate in Human Development

Profession: Volunteer in Social Assistance
Center (ONI PEP)

“What I like the most is that whilst having such important people as lecturers, most of them have the availability and kindness to answer questions, and even in many cases, to debate. I really appreciate having many different disciplines assembled in the same place and debating a topic from different (in some cases opposite) points of view. This is enriching and meaningful!”

Laurea Elizabeth Gonzalez – Zapopan, Mexico

Education: Bachelor in International Relations

Profession: Administrative Director of the Municipal
Development Planning Committee

“I really recommend IGLUS to everybody who is looking for solutions for their communities, cities or country by tackling the challenges already faced by the large cities of the world, and looking ahead to uncover the challenges of the future. The academic environment is very supportive, no matter where you are from and what your background is. “



Umut Alkim Tuncer - Istanbul, Turkey

Education: Bachelor's Degree in Translation & Interpretation – currently doing a Master's degree in Urban Systems and Transportation Management

Profession: In charge of international relations at the Public Transportation of Istanbul



“This program is designed such that one can find a fine balance between theory and practice. In each module, students are able to learn about existing governance structures, infrastructure and problems related to the city they visit. Then, they have the theoretical lessons in parallel and discuss what they have learned altogether.”

Jean Caris - Rio de Janeiro, Brazil

Education: Bachelor in Economics / Master of Business Administration

Profession: Under Secretariat of Chief of staff development in city government of Rio



“We have the chance to see in locus the main challenges of 6 amazing cities and learn through a multidisciplinary approach and under the points of view of academicians, NGOs, city officials, private sector and our classmates. Furthermore, the atmosphere of IGLUS provides an opportunity for a global networking with colleagues and specialists from all around the world.”

EPFL Management of Energy and Sustainability (MES): Master Student Projects

As part of their coursework, the EPFL Master Students in Energy Management and Sustainability have to accomplish a semester assignment within 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 giving you insight into the student's involvement, here a few samples of the best projects they wrote:

Governance Effect on Innovations in the Public Urban Transport Sector: Case Study of Real Time Scheduling in Lausanne

Michel Abi Akl



This research project by Mr. Abi Akl examines the effects of governance on the capabilities of innovation in the urban public transportation sector. This paper examines how governance can lead and affect innovations in the system. To answer these questions, a case study was carried out to investigate the development of real-time scheduling for public transportation in Lausanne, which is considered one of the smallest cities with an efficient and well-developed public transportation sector.

The case study includes an interview with Mr. Mischler Alexandre, in charge of passenger information and distribution services, and with Mr. Meyer Pierre-Yves, in charge of collaborations project development and IT services at "Transports Publics de la Région Lausannoise".

Toward a sustainable use of water in urban areas: Comparison of San Francisco and Detroit

Boris Thurm



This study aims to understand different approaches to urban water sustainability through a comparison of two American cities, San Francisco and Detroit. Water sustainability includes environmental, economic, and social aspects, and the interconnection between water and energy is a key component to achieve sustainability.

To improve the current water scarcity situation, a complete management plan must be elaborated, including capital improvements, human resources and financial plans. An educational program develops water scarcity awareness and increases the efficiency of water conservation politics. Adequate prices reduce over-consumption and promote economic and social sustainability. A lot of progress can still be made, especially in terms storm-water management and reuse of recycled water.

Towards more sustainable urban systems

Maxime Audouin



Today, Stockholm is considered one of the most sustainable cities in the world. In 2010, the city was awarded Europe's first Green Capital and was ranked 2nd according to the Siemens Green City Index. Stockholm's success was realized primarily through decades of effort put in by various actors and thanks to a strong political drive to reach the city's sustainability goals (reduce the city's total GHG emissions, reduce carbon emissions, become fossil fuel free, improve renewable energy use).

One of the main drivers of Stockholm's transition into a green city has been the development of its heating district, which has few equivalents elsewhere in the world. With district heating, energy production becomes 80 percent renewable, energy resources are used rationally, and an innovative system is used to convert waste into energy. In this research, we aim to understand how the governance of district heating was settled and how it helped the city of Stockholm to become green. In order to achieve this goal, the 'Urban Governance framework' is used to analyze this transition and the different actors.

Restructuring governance for integrated land use and transportation planning: A case study of Lausanne urban area



Erik Zakhia

In this paper, Mr. Zakhia explores the importance of coordinating land-use and transportation planning to ensure sustainability. The focus of this work is on the establishment of an effective governance structure at the agglomeration level in order to increase the coordination among territorial, political and departmental divisions.

The thesis contains a case study conducted for the Lausanne – Morges Agglomeration Project, and explores its evolution, and identifies how the agglomeration governance was restructured, its main stakes and actors and their relationships. Its governance structure is based in horizontal and vertical processes, with the Vaud Canton (regional authority) occupying the pivotal role, being at the same time a partner with communes, and the regulating authority.

The paper also succeeds at analyzing the main factors, outcomes and challenges of the case study. The author tries to generalize some of the most relevant findings that can help to reinforce coordination. Two of the main elements identified are federal conditional financing with clear objectives, and the establishment of a more stringent legal framework.

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.

Inaugural workshop on the governance of large urban infrastructures as socio-technical systems



February 1st 2015, Ras Al-Khaimah, UAE

The Inaugural workshop on the governance of large urban infrastructures as socio-technical systems brought together a limited number of scholars working on the governance of urban infrastructure systems such as energy, transport, water, waste, greens, communications, and housing. The workshop was structured as a set of expert discussions around the presentations given by each participant. The aims of this workshop were to:

- Define a common research agenda for the upcoming 5 years;
- Serve as an input for a joint publication (most likely a special issue of Utilities Policy);
- Constitute a first step towards the creation of a research community focused on the governance of urban infrastructures.

Based on the outputs of this workshop, we developed future plans for the IGLUS Training Series, defined research projects to train new IGLUS PhD students, and shared ideas about interdisciplinary approaches for analyzing the transition of urban infrastructures such as transportation, energy, and water.

Smart Cities Summit

25 February 2014, Guadalajara, Mexico



The Smart Cities Summit Guadalajara 2014 was an open event held at Tecnológico de Monterrey Campus Guadalajara on February 25th, 2014. The main goal was to discuss the challenges that Guadalajara's Metropolitan area faces on the road to becoming a smarter urban system. The summit was a half-day of lectures and talks that gathered over 100 city officials, industry participants and students to analyze the following topics:

- City governance as a challenge for Mexican municipalities;
- Innovation difficulties in Mexican cities: The case of Ciudad Creativa Digital and Distrito Tec (mobility);
- Government innovation for citizen involvement in decision-making; and
- The role of private actors and investment in smart cities: The IBM case.

Participants included policy-makers, managers and academics from the region, covering fields of expertise ranging from the energy sector, to intelligent systems, to policy and governance.

Workshop on Clean Energy and Smart Grids in the Persian Gulf – Potential and Applications

10-11 June 2012, Abu Dhabi



The workshop on “Clean Energy and Smart Grids in the Persian Gulf – Potential and Applications” was co-organized by EPFL and the Masdar Institute, and was focused on the applications and benefits of clean energy and intelligent urban energy systems. In particular, its aims were to:

- Identify the challenges and the opportunities regarding the transition of urban systems towards cleaner energy practices;
- Explore how intelligence, in particular the active use of the Information and Communication Technologies (ICTs), can, and already does contribute to cleaner urban energy practices; and
- Discuss how the governance of such intelligent urban energy systems can be improved.

Participants included policy-makers, managers and academics from the region, covering fields of expertise that ranged from the energy sector, to intelligent systems, to policy and governance.

Publications

A Multidisciplinary Conceptual Framework for Urban Governance Studies: Insights from Social, Political and Economic Theories of Governance - EURA conference - June 2013



The aim of this paper is to explain and conceptualize the interrelatedness of technological, social, economic and political (STEP) systems within the context of urban infrastructure systems. Based on this conceptualization and a review of three main theoretical perspectives on urban governance, namely the political, social and economic theories of urban governance, the understudied role of technology in existing theories of urban governance is highlighted.

To fill this research gap, a multidisciplinary conceptual framework for the analysis of urban governance is proposed. The framework is developed on the basis that governance is a mechanism for the establishment of order among actors with conflicting interests, in order to achieve a mutual goal. Thus, the main building blocks of our urban governance conceptual framework are the actors, their vested interests and their relative power to pursue their interests.

The actors in this framework, which are extracted from the social, political, economic theories of urban governance, are: city government, national (in cases, state) government, investors, infrastructure service provision companies, and users (citizens and businesses). Relationships between actors in the systems are explained and the primary vested interests of each actor group and their power sources are reviewed and categorized.

By using this actor-interests-power approach, and by covering three of the main research traditions on urban governance, the proposed framework is developed for multidisciplinary analysis purposes. In the last part of the paper, limitations and future research possibilities are outlined.

Keywords: governance, technology, urban, infrastructure

GIPC Vol 1, Issue 1 - Governance, Innovation and Performance in Cities - Spring 2015



GIPC, as it abbreviates, is dedicated to the analysis of Governance, Innovation and Performance in Cities. GIPC is an online quarterly publication aimed at sharing knowledge and experience among scholars and practitioners who are interested in improving the performance of cities, in terms of quality of services, sustainability, resilience and livability. GIPC's mission is to provide a medium for the analysis of policies and practices related to the performance of cities. GIPC is aimed at bridging the 'gap' between practitioners and scholars. IGLUS and GIPC empower a global dialogue among urban actors. GIPC is published at the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland. It is openly accessible at www.iglus.org.

January 2015

Matthias Finger - Mohamad Razaghi (shortened introduction)

How Seoul used the 'T-Money' smart transportation card to re-plan the public transportation system of the city; implications for governance of innovation in urban public transportation systems - IETT TranslST Symposium – Dec. 2015



In 2004, Seoul introduced a new a smart card system that significantly changed the way the public transportation system functioned in the city. This card, called the T-Money card, used Radio Frequency Identification (RFID) Technology to improve the public transportation system in Seoul by bringing different advantages to users, such as free transfer between all the transportation modes, removing the cash-payment burden and time losses at the transportation gates, and enabling the fleets in the public transportation system to better respect their schedules. More than improving the conditions of the urban transportation system, the T-Money card had a real impact on the lives of many urban dwellers by enabling them to save significant amounts of money by introducing a new fare system. The success of this project has heralded the Seoul transportation system as a global hallmark of efficiency. In this paper we explain the main challenges that Seoul had to overcome to launch this initiative and how changes in the governance structure of the public transportation system in Seoul supported the design and implementation of the smart card system in the Seoul metropolitan area.

Keywords: governance, innovation, public transportation, Smart Card, transportation, energy

Partners

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.

Industry



Universities



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INNOVATIVE GOVERNANCE
OF LARGE URBAN SYSTEMS