



THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

**7th Annual International Conference on
Transportation
31 May & 1-3 June 2021, Athens, Greece**

Edited by
Gregory T. Papanikos

2021

Abstracts
7th Annual International
Conference on Transportation
31 May & 1-3 June 2021,
Athens, Greece

Edited by Gregory T. Papanikos

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TABLE OF CONTENTS

(In Alphabetical Order by Author's Family name)

Preface		7
Organizing & Scientific Committee		8
Conference Program		9
1.	Methodology in Urban Planning: The Case of Turkey's Istanbul Municipalities <i>Gizem Aksümer</i>	12
2.	Decision Making in City Planning: Processes of Visioning and Stakeholders Engagement in Relation to Sustainable Land-Use <i>Alessandro Betta, Angelica Pianegonda, Anastasia Nikologianni, Sara Favargiotti, Marco Ciolli, Mattia Andreola, Kathryn Moore, Elisa Morganti, Alessandro Gretter, Martin Berg, Anna Ternell & Nick Grayson</i>	13
3.	Exploring the Metacoupling on Rural Gentrification by Social Network Analysis <i>Tzu-Ling Chen & Ting-Xuan Chen</i>	15
4.	Cruise Ship-Source Pollution by UV Filters <i>Jelena Culin, Toni Bielic, Vlatko Knezevic & Zoran Pavin</i>	17
5.	The Role of Banking Foundations in Urban Regeneration Processes on the Italian Scene <i>Corinna Di Franco</i>	18
6.	Through Assistance of Social Networking Platforms <i>Thomas Ehrl, Jonathan Adams & Stefan Kaczmarczyk</i>	19
7.	Art, Architecture & the Urban Fabric: The City: A Museum without Walls? <i>Charlott Greub</i>	20
8.	On the Study of the Relevance of Health and Comfort-Related Street Environment Attributes on Affecting People's Recreational Walking Behaviour <i>Xintong Ma & Chi kwan Chau</i>	21
9.	Advanced Joining Processes Unit: Objective based Academic Research <i>Eduardo Marques, Ricardo Carbas & Lucas da Silva</i>	22
10.	Assessing Potential of Bike Share Networks and Active Transportation to Improve Urban Mobility, Physical Activity and Public Health Outcomes <i>Dimitra Michalaka</i>	24
11.	Digital and Physical Margins Pre-Visions for New Interactions in the City in Progress <i>Maria Carola Morozzo della Rocca, Alessandro Bertirotti & Federica Delprino</i>	25
12.	Territorial Infrastructure: Drafting of a Calculation Evaluation Method <i>Elsa Negas & Rui Seco</i>	27

13.	How Can Landscape Architecture Influence Systemic Change to Achieve Sustainable Cities and Regions <i>Anastasia Nikologianni</i>	28
14.	PIRAMIDE, An Innovative Educational Program Based on Research: Some Results and Lessons Learned <i>Santiago Pindado</i>	30
15.	COVID-19: Cartography as a Witness of Change of Spanish Urban Models along History due to Sanitary Crisis <i>Barbara Polo-Martin</i>	31
16.	The Smartphone as a Participatory Response to Changes in the Understanding of Democracy and Planning of Transport Projects <i>Nicole Raddatz</i>	33
17.	Oil Pollution of the Mediterranean as a Result of Maritime Accidents <i>Dani Sabalja</i>	35
18.	Clustering Urban Areas Based on GPS Trajectories and Geospatial Data <i>Siavash Saki & Tobias Hagen</i>	36
19.	The Graphic Expressive Forms of Resilience and Regeneration from Art to Historical and Contemporary Architecture <i>Francesca Salvetti & Michela Scaglione</i>	38
20.	Start2Park Determining, Explaining and Predicting Cruising for Parking <i>Sabine Scheel-Kopeinig, Tobias Hagen & Siavash Saki</i>	39
21.	The Lisbon Story: Twelve Years of Public Participation Approaches, Mechanisms and Practices <i>Miguel Silva Graca</i>	41
22.	City on the Rails <i>Nikoleta Slováková</i>	43
23.	A Study of Architectural and Cultural Symbols along the Grand Canal - Centered on Merchant Buildings of Ming and Qing Dynasties <i>Liping Sun & Jing Liang</i>	44
24.	Cartographic Style Tendencies in News Maps <i>Rita Viliuviene</i>	45
25.	Research on a Value-Oriented Regeneration of Historical Districts A Case Study of Qingdao Sifang Road Historical District <i>Linxing Wang</i>	47
26.	Acceptance of Autonomous Shuttle Services by the Local Population: A Case Study in Three Small and Medium-Sized Cities <i>Mathias Wilde & Jakob Rebhan</i>	49

Preface

This book includes the abstracts of all the papers presented at the *7th Annual International Conference on Transportation* (31 May & 1-3 June 2021), organized by the Athens Institute for Education and Research (ATINER).

A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into 6 divisions and 37 units. Each unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed on the following page.

Gregory T. Papanikos
Pres'

**7th Annual International Conference on Transportation, 31
May & 1-3 June 2021, Athens, Greece**

Organizing & Scientific Committee

All ATINER's conferences are organized by the Academic Council. This conference has been organized with the assistance of the following academic members of ATINER, who contributed by reviewing the submitted abstracts and papers.

1. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, U.K.
2. Nicholas N. Patricios, Vice President of Strategic Planning & Analysis, ATINER and Professor & Dean Emeritus, School of Architecture, University of Miami, USA.
3. Clara Germana Gonçalves, Head, Architecture Unit, ATINER & Researcher, CITAD (Centro de Investigação em Território, Arquitectura e Design), Lusíada University, Portugal.
4. Virginia Sisiopiku, Head, Transportation Engineering Unit, ATINER, & Associate Professor, The University of Alabama at Birmingham, USA.
5. Jesus J. Lara, Academic Member, ATINER & Associate Professor, The Ohio State University, USA.
6. Giulia Pellegrini, Vice Dean & Associate Professor, Architecture-Polytechnic School, University of Genoa, Italy.
7. Theodore Trafalis, Director, Engineering & Architecture Division, ATINER, Professor of Industrial & Systems Engineering and Director, Optimization & Intelligent Systems Laboratory, The University of Oklahoma, USA.
8. Keshav Bhattarai, Academic Member, ATINER & Professor and Geography Program Coordinator, University of Central Missouri, USA.
9. Mike Mavromihales, Academic Member, ATINER & Senior Lecturer and Course Leader, University of Huddersfield, UK.

FINAL CONFERENCE PROGRAM
7th Annual International Conference on Transportation, 31 May & 1-3
June 2021, Athens, Greece
PROGRAM

Monday 31 May 2021

09.00-10.00
Registration

10.00-11.00

Opening and Welcoming Remarks:

- **Gregory T. Papanikos**, President, ATINER.
 - **Nicholas N. Patricios**, Vice President of Strategic Planning & Analysis, ATINER and Professor & Dean Emeritus, School of Architecture, University of Miami, USA.
 - **Clara Germana Gonçalves**, Head, Architecture Unit, ATINER & Researcher, CITAD (Centro de Investigação em Território, Arquitectura e Design), Lusíada University, Portugal.
 - **Virginia Sisiopiku**, Head, Transportation Engineering Unit, ATINER, & Associate Professor, The University of Alabama at Birmingham, USA.
-

11:00-11:30

Maria Carola Morozzo della Rocca, Associate Professor, University of Genova, Italy.

Title: Digital and Physical Margins Pre-Visions for New Interactions in the City in Progress.

11:30-12:00

Jelena Culin, Associate Professor, University of Zadar, Croatia.

Toni Bielic, Professor, University of Zadar, Croatia.

Vlatko Knezevic, PhD Student, University of Zadar, Croatia.

Title: Cruise Ship-Source Pollution by UV Filters.

12:00-12:30

Dani Sabalja, Assistant Professor, University of Rijeka, Croatia.

Title: Oil Pollution of the Mediterranean as a Result of Maritime Accidents.

12:30-13:00

Mathias Wilde, Professor, Coburn University Germany.

Jakob Rebhan, Research Associate, Coburn University, Germany.

Title: Acceptance of Autonomous Shuttle Services by the Local Population: A Case Study in Three Small and Medium-Sized Cities.

13:00-13:30

Santiago Pindado, Professor, Universidad Politecnica de Madrid, Spain.

Title: PIRAMIDE, An Innovative Educational Program Based on Research: Some Results and Lessons Learned.

13:30-14:00

Dimitra Michalaka, Associate Professor, The Citadel, USA.

Title: Assessing Potential of Bike Share Networks and Active Transportation to Improve Urban Mobility, Physical Activity and Public Health Outcomes.

14:00-14:30 Lunch

14:30-15:00

Gizem Aksümer, Assistant Professor, Mimar Sinan Fine Arts University, Turkey.

Title: Methodology in Urban Planning: The Case of Turkey's Istanbul Municipalities.

15:00-15:30

Nicole Raddatz, Research Associate, University of Kassel, Germany.

Title: The Smartphone as a Participatory Response to Changes in the Understanding of Democracy and Planning of Transport Projects.

15:30-16:00

Anastasia Nikologianni, Postdoctoral Research Fellow, Birmingham City University, UK.

Title: How Can Landscape Architecture Influence Systemic Change to Achieve Sustainable Cities and Regions.

16:00-16:30

Charlott Greub, Assistant Professor, North Dakota State University, USA.

Title: Art, Architecture & the Urban Fabric: The City: A Museum without Walls?

16:30-17:00

Alessandro Betta, Researcher, Edmund Mach Foundation, Italy.

Title: Decision Making in City Planning: Processes of Visioning and Stakeholders Engagement in Relation to Sustainable Land-U.

17:00-17:30

Elsa Negas, Researcher, Lusiada University – CITAD, Portugal.

Rui Seco, Researcher, Lusiada University – CITAD, Portugal.

Title: Territorial Infrastructure: Drafting of a Calculation Evaluation Method.

Tuesday 1 June 2021

10:00-10:30

Tzu-Ling Chen, Assistant Professor, University of Taipei, Taiwan.

Title: Exploring the Metacoupling on Rural Gentrification by Social Network Analysis.

10:30-11:00

Liping Sun, PhD Student, Southeast University, China.

Jing Liang, PhD Student, Southeast University, China.

Title: A Study of Architectural and Cultural Symbols along the Grand Canal – Centered on Merchant Buildings of Ming and Qing Dynasties.

11:00-11:30

Linxing Wang, PhD Candidate, Southeast University, China.

Title: Research on a Value-Oriented Regeneration of Historical Districts: A Case Study of Qingdao Sifang Road Historical District.

11:30-12:00

Xintong Ma, PhD Student, Hong Kong Polytechnic University, Hong Kong.

Title: On the Study of the Relevance of Health and Comfort-Related Street Environment Attributes on Affecting People's Recreational Walking Behaviour.

12:00-12:30

Corinna Di Franco, PhD Student, Technical University of Madrid, Spain.

Title: The Role of Banking Foundations in Urban Regeneration Processes on the Italian Scene.

12:30-13:00

Thomas Ehrh, PhD Student, The University of Northampton UK.

Title: Learning Preferences of Specialists of the Lift Industry and Improved Learning Acquisition through Assistance of Social Networking Platforms.

13:00-13:30

Siavash Saki, Research Assistant, Frankfurt University of Applied Sciences, Germany.

Title: Clustering Urban Areas Based on GPS Trajectories and Geospatial Data.

13:30-14:00 Lunch

14:00-14:30

Sabine Scheel-Kopeinig, Senior Researcher, Frankfurt University of Applied Sciences, Germany.

Title: Start2Park Determining, Explaining and Predicting Cruising for Parking.

14:30-15:00

Miguel Silva Graca, Senior Researcher, CITTA-UC, Portugal.

Title: The Lisbon Story: Twelve Years of Public Participation Approaches, Mechanisms and Practices.

15:00-15:30

Nikoleta Slováková, PhD Student, Czech Technical University in Prague, Czech Republic.

Title: City on the Rails.

15:30-16:00

Rita Viliuviene, Ph.D. Student, Vilnius University, Lithuania.

Title: Cartographic Style Tendencies in News Maps.

16:00-16:30

Barbara Polo-Martin, Lecturer, Valencian International University, Spain.

Title: COVID-19: Cartography as a Witness of Change of Spanish Urban Models along History due to Sanitary Crisis.

16:30-17:00

Eduardo Marques, Researcher, University of Porto/INEGI, Portugal.

Title: Advanced Joining Processes Unit: Objective based Academic Research.

17:00-17:30

Francesca Salvetti, Adjunct Professor, University of Genoa, Italy.

Michela Scaglione, Adjunct Professor, University of Genoa, Italy.

Title: The Graphic Expressive Forms of Resilience and Regeneration from Art to Historical and Contemporary Architecture.

Gizem Aksümer

Assistant Professor, Mimar Sinan Fine Arts University, Turkey

Methodology in Urban Planning: The Case of Turkey's Istanbul Municipalities

During Turkey's 60-year history of modern planning, 90% of all plans between 1933 and 2000 were arranged, granted, and conducted by the public authority (Provincial Bank; Gezim and Kiper, 2016), although a majority of these (70%) were then tendered to private planning offices supervised or inspected by the public authority. In contrast, the majority of developmental plans are currently implemented by local municipalities, although the working and implementation methodology remains similar to that of Provincial Bank. The planning literature in Turkey has focused on criticizing the planning system that accompanies the neoliberal market economy while urban planning research has focused on the problems that emerge at the end of the process to explain the frequent failures to implement urban plans. Meanwhile, other topics are not researched enough, such as the conduct of planning or the research and decision-making methodologies used in Turkish planning system.

Accordingly, this study examines the planning methodologies used in Turkey's planning system, focusing on Istanbul's local and metropolitan municipalities. The study draws on Diller (2018: 5), who identified six planning method areas: communicative process management, spatial structures and processes, forward-looking statements, targeting, urban design, and decision making. The detailed planning methodologies and techniques using in Turkish planning process were categorized and an online survey was designed and administered to participants from Istanbul metropolitan municipality and all 38 sub-provincial municipalities. Based on analysis of the survey responses, in-depth interviews were conducted with urban planners in top positions in the municipalities. Additionally, urban plan examples in different scales are examined to see the different methodologies in detail.

The findings revealed that Istanbul's municipalities are using old-fashioned and non-innovative methodologies. This prevents planners from accessing tacit knowledge and adopting a participatory planning approach.

Alessandro Betta

Researcher, Edmund Mach Foundation/University of Trento, Italy

Anastasia Nikologianni

Post Doctorate Research Fellow, Birmingham City University, United
Kingdom

Angelica Pianegonda

PhD Candidate, University of Trento, Italy

Sara Favargiotti

Professor, University of Trento, Italy

Marco Ciolli

Professor, University of Trento, Italy

Mattia Andreola

Research Associate, University of Trento, Italy

Kathryn Moore

Professor, Birmingham City University, United Kingdom

Nick Grayson

Green City Manager, Birmingham City Council, United Kingdom

Elisa Morganti

Innovation Project Manager, Hub Innovazione Trentino, Italy

Martin Berg

Property Management Administrator, Gothenburg City Council,
Sweden

Anna Ternell

Sustainability Strategist, PE, Sweden

&

Alessandro Gretter

Research and Innovation Centre - Fondazione Edmund
Mach/University of Trento, Italy

**Decision Making in City Planning:
Processes of Visioning and Stakeholders Engagement in
Relation to Sustainable Land-Use**

The SATURN project deals with rural-urban territories, their landscape and environmental challenges. The land of our cities and regions are fragmented and prone to several challenges in terms of ecology, governance and social coherence. As a result of unregulated overlapping of different land uses and complex governance patterns, landscape fragmentation creates severe challenges in the ways the land is perceived, identified and therefore managed. The SATURN consortium is working on different models to help address the governance and decision-making process and support on a policy level

by applying holistic ideas of visioning and stakeholder engagement at a city scale. The diversity of the three hubs (Birmingham in central England, Gothenburg in western Sweden, and Trentino in northern Italy) is reflected by their approaches to stakeholders' engagement and visioning processes and, consequently, on the tools' usage they make themselves. Within the SATURN project, we are investigating how these approaches could change perceptions and impact on landscape strategic actions. Through a series of especially designed workshops on landscape visioning and stakeholder engagement, the project aims to create a toolbox supporting urban, peri-urban and regional planning. This paper reports on the visioning and stakeholder mapping and analysis tools, and shares examples where these processes were tested during the broader SATURN scheme. Results demonstrate how the visioning exercise has changed public perceptions about an area and how this has affected the decision-making process of each city towards a more effective planning of sustainable landscapes. The stakeholder engagement activity demonstrates the importance of 'mapping and analysis' of the various actors involved in a city and the ways a landscape project can effectively engage with them and seek further collaboration. Questions on how the results (if they) differ in cases where the stakeholder engagement process focused on a broad policy level or targeted specific actions for a certain region are being explored.

Both the visioning and stakeholder engagement tools are subject to a holistic approach and a collaborative and open process between the stakeholders and the trainers, allowing the participants to build a vision for their regions and be one-step closer to systemic change.

Tzu-Ling Chen

Assistant Professor, University of Taipei, Taiwan

&

Ting-Xuan Chen

Student, University of Taipei, Taiwan

Exploring the Metacoupling on Rural Gentrification by Social Network Analysis

Around the globe, the globalization refers to an open flow (i.e., the flow of people, goods, and information) and many countries around the world remain constantly connected, at the same time affecting relationships between multiple other countries. Telecoupling is a process that connects distant systems, and refers to socioeconomic and environmental interactions between distant coupled human and natural systems (Liu et al., 2013 Friis et al., 2015 Sun et al., 2018).

In today's globalized world, different regions are increasingly connected with other distant places (e.g., other countries to environmental and socioeconomic interactions over distances by telecouplings (Meyfroidt et al., 2013; Verburg et al., 2013). Especially, the impact of telecoupling not only occurs in urban areas, but also changes land use in rural areas (Hayter et al., 2003; Liu et al., 2013; Friis et al., 2015). In the past, the discussion of driving forces of land use change was focus on spatial association or spatial autocorrelation which is neighbor effect of influencing factors of land use change. Telecouplings between distant coupled human and natural systems can interact with pericouplings and intracouplings (Liu 2017), and interactions challenge classical place based land system analysis (Seto et al., 2012 Guneralp et al., 2013). Under the influence of globalization and the flows it's derived, it is necessary to include telecouplings between distant coupled human and natural systems in the discussion of l and use change. Effects of telecouplings were varied and complex including positive or negative environmental and socioeconomic effects throughout multiple systems such as the studies encompassed distant transfers of money and goods in developed countries (Carrasco et al., 2017; Eakin et al., 2017; Zimmerer et al. al., 2018). Therefore, we researched whether the rural areas have been affected by metacoupling. Through the rural gentrification discusses the coupling between human nature interactions, and attempts to verify the dynamics of rural gentrification and identify driving forces of land use change.

Our study area is Yilan, Taiwan, it is the rural areas with high accessibility and advantages in environmental resources. Through

preliminary quantitative analysis, it can be seen that Yilan, as a rural area close to the metropolitan area and with major driving forces of land use change, has the potential to discuss about rural gentrification and metacoupling. Therefore, we use social network analysis and questionnaire surveys to study social network, and to verify the construction of farmhouses in the process of rural gentrification is affected by the metacoupling. Our research reveals that the local land use changes are related to the actors in rural gentrification and the driving factors of metacoupling, local human nature interactions can affect land use. Through the analysis results, it can be seen that the gentrifiers changed local land use and indirectly affected regional development. Our study highlights that urban rural interactions of land use change driven by metacoupling and the conflicts of environment and development may affect metacouplings. With further understanding of the feedback of metacoupling, planners can plan effective development strategies to achieve sustainable development, and better predict human nature interactions of distant places, or clarify regional positioning and make effective development recommendations.

Jelena Culin

Associate Professor, University of Zadar, Croatia

Toni Bielic

Professor, University of Zadar, Croatia

Vlatko Knezevic

PhD Student, University of Zadar, Croatia

&

Zoran Pavin

Assistant, University of Zadar, Croatia

Cruise Ship-Source Pollution by UV Filters

The impact of shipping on the Mediterranean Sea has to be investigated in more detail to determine measures that can contribute to achieving the Sustainable Development Goal 14: *Conserve and sustainably use the oceans, seas and marine resources for sustainable development*. Spills and operational discharges of oil, cargo, and wastewater to sea negatively affect marine organisms and may jeopardize human health and significant efforts are put into research related to the prevention of pollution. Current studies mainly focus on regulated substances such as oil, hazardous and noxious substances, hazardous and noxious substances, and thermotolerant coliforms. However, ship wastewater may be a significant source of emerging contaminants including pharmaceuticals, flame retardants, microplastics, and sunscreens. Cruise ship-generated wastewater may contain more UV filters than effluent from the urban wastewater treatment plant. Bearing in mind that UV filters are also transferred into the sea from beachgoers and that the daily flux may be elevated during the tourist season there is a need to address this issue. This study reviews the environmental impacts of UV filters and their occurrence in ship wastewater. Research gaps and possible measures are identified.

Corinna Di Franco

PhD Student, Technical University of Madrid, Spain

The Role of Banking Foundations in Urban Regeneration Processes on the Italian Scene

In the context of urban regeneration policies, we are witnessing a multiplication of the actors involved and the forms of mutual interaction they realize among themselves. Conflicts, unresolved contrasts, but also possibilities of emancipation underlie most of the compromises prior to a regenerative action. But if an actor is part of the world of philanthropy, the game of interactions is complexified with new variables that fluctuate between altruism and entrepreneurial spirit.

The purpose of this paper will be to shed light on the role of a peculiar actor of the Italian scene who belongs to the no-profit, philanthropy sector: the foundations of banking origin. These are private entities that manage community funds and whose mission is towards 'social utility and promotion of economic development' on a provincial, interprovincial or regional scale. In order to achieve their mission they make their assets yield a return through various types of investments, the profits of which are used to fuel donations and projects spread on the territories, generally directed towards third sector organisations. Doing so, they build strong relationships with the place where they are located, with which they generally share a long and deep-rooted history. Health care and assistance, scientific research, cultural activities, art, environment, education, local development and local social housing are some of the fields of action of the banking foundations. The physical as the social domain of the territories where they belong is affected by their activities, usually presented as social innovation projects.

The study presents some case studies in order to understand if this class of urban actor is really triggering processes of regeneration or rather simple transformation of the urban environment. In other words if its role of developer is prevailing or not on its role of social promoter. The results provide significant insights into the world of the third sector and over an actor that straddles between public and private, formal and informal forms of action and dialogue with the citizenship.

Thomas Ehrl

PhD Student, The University of Northampton UK & Head of Learning
& Transformation Delivery, thyssenkrupp Steel Europe AG, Germany

Jonathan Adams

Professor, The University of Northampton UK

&

Stefan Kaczmarczyk

Professor The University of Northampton UK

Through Assistance of Social Networking Platforms

Emerging technologies require Lift Engineering specialist (but non-exclusive) to continuously learn about new technologies and materials, new engineering concepts and its entry into product design. Modern communication channels have changed the way, people interact and communicate with each other. And even further, digital technology drives the concepts of advanced learning and allows access to learning environment anytime, anywhere.

Based on the results of a qualitative data analysis of interviews conducted with global specialist of the Lift Industry, this study examines the relationships of their horizon of experience, learning preferences and user behavior with Social Networking platforms.

The paper concludes with a recommendation for the development and further consolidation of a new Knowledge Transfer Model of Advanced Dynamics of Passenger Transportation Systems in Buildings for a Multi-cultural/Multi-discipline R&D discipline Environment.

Charlott Greub

Assistant Professor, North Dakota State University, USA

**Art, Architecture & the Urban Fabric:
The City: A Museum without Walls?**

Because Architecture is a wide cultural phenomenon and is related to ideas, discourses and practices: Architecture is not only about buildings, it's a set of ideas. It is pervasive through every part of our lives. Architecture is a public art and therefore architects and artists should add something to culture with every gesture that is inserted into the city. This of course translates into things that you do through buildings, but also leads into a cultural discourse: bringing out new ideas to change cities and the ways we live. The rise of performance in architecture: Back to the streets: is a movement called tactile urbanismus initiated by architects and artists working collaborative that are trying to reengage with the city and echoes the Performing Arts Movement (Situationists, Fluxus, Happenings etc. in the Mid 1960's-1970's), a genre within the Arts based on the idea that the city acts like a museum itself. Based on this interdisciplinary approach I will discuss a proposal by Urban Art Lab a competition entry for two blocks (69/70) Downtown Salt Lake City in form of an Urban Cluster that consist of installations, art interventions and new public spaces.

Xintong Ma

PhD Student, Hong Kong Polytechnic University, Hong Kong

&

Chi kwan Chau

Associate Professor, Hong Kong Polytechnic University, Hong Kong

**On the Study of the Relevance of Health and Comfort-
Related Street Environment Attributes on Affecting
People's Recreational Walking Behaviour**

Walkability has been the most popular topic due to the diseases caused by a lack of physical activities. Hence, this study aimed to investigate the effect of different environmental attributes on pedestrian comfort for the aim to improve walking level. And this study also tried to reveal the tradeoffs made among the six health and comfort-related street environment attributes by using a discrete choice experiment. The six attributes including air quality, thermal environment, noise perception, landscape, sidewalk and street amenities. 247 valid questionnaire responses have been collected via online mode. The findings confirmed that people's walking intention and route choice were affected by their perceived comfortability of a street. The participants placed the greatest importance on air quality for intending to walk for recreation, followed by thermal environment and noise. This finding provides valuable insights for urban planners to formulate a more pedestrian-friendly walking environment for members of public, for the sake of promoting exercise to tackle the physical inactivity phenomenon.

Eduardo Marques

Researcher/Invited Assistant Professor, University of Porto/INEGI,
Portugal

Ricardo Carbas

Researcher/Invited Assistant Professor, University of Porto/INEGI,
Portugal

&

Lucas da Silva

Full Professor, University of Porto/INEGI, Portugal

**Advanced Joining Processes Unit:
Objective based Academic Research**

The Advanced Joining Processes Unit (AJPU) part of the Institute of Science and Innovation in Mechanical and Industrial Engineering (INEGI) and the Faculty of Engineering of the University of Porto (FEUP), is a leading research unit in the field of mechanical engineering, performing both fundamental and practical research on advanced joining processes, from welding to adhesive bonding. This unit has a very particular, result oriented operation, as it combines academic activities, extensive scientific publication and consistent graduation of MSc and PhD candidates, with high responsibility consulting research projects. Although they appear to be distinct, these two separate aspects are in fact interconnected, as experience has demonstrated that performing sound and cutting edge research work in such a technological field can only be achieved if a serious effort is constantly being made on fundamental research and in the training and education of future researchers. In addition, research and development departments of modern technological companies are now highly aware of published research and will favour scientific research units which have a consistent track record on novel research and technological transfer. To operate in this manner, a research group must be well staffed, organized, and be as streamlined as possible to allow for impactful generation of scientific knowledge and still provide quick answers industrial challenges. The unit is structured by having several post-doctoral researchers, operating directly under the unit leader, that are responsible for different key areas and can coordinate with all other researchers of the unit to ensure that work is being carried out efficiently with the resources available and with maximum knowledge transfer. Group meetings are regularly organized to ensure direct communication between the members of the unit, creating opportunities for generating synergies between lines of research within

the group that might appear to only be lightly connected at first. This work will present a detailed description and analysis of the operation of the AJPU, describing in detail the evolution of the methods being used to boost productivity and academic success, how the scientific knowledge can be transferred to students and the community, describe funding strategies, the results obtained and possible paths for future improvement.

Dimitra Michalaka

Associate Professor, The Citadel, USA

**Assessing Potential of Bike Share Networks and Active
Transportation to Improve Urban Mobility, Physical
Activity and Public Health Outcomes**

Not Available

Maria Carola Morozzo della Rocca

Associate Professor, University of Genova, Italy

Alessandro Bertirotti

Adjunct Professor, University of Genova, Italy

&

Federica Delprino

PhD Student, University of Genova, Italy

Digital and Physical Margins Pre-Visions for New Interactions in the City in Progress

COVID-19 era forced society, cities and shared spaces at the edges of society, progressively shattering their own memory.

The most common and crowded places have become almost exclusively virtual, hastening a process of digitalization and technological growth aimed by the Sustainable Development Goals (SDGs) of the 2030 UN 'Agenda' but which is still immature and superficial because, in many cases, it is forced by emergency rather than by a conscious planned evolution.

The pandemic event, in its dramatic relevance, has demonstrated the wish of Antonio Guterres, Secretary-General of the United Nations, to "leave no one behind" and has reinforced the need to look at the different SDGs with an interdisciplinary and systemic approach (Bistagnino, 2009), in order to achieve a real benefit from existing experience and to foresee future scenarios and better living environments.

Moreover, the temporary emptying of metropolitan areas and the denial of social relations at all levels - personal, work, psycho-cultural and recreational - has progressively, but not indelibly, determined a sort of schizophrenia of the 'signifiers' as well as the 'meanings' of the urban fabric, of the memory of the use of spaces as well as of public buildings or private houses.

Specifically, the collective buildings for education, culture and work have been voided in favour of an 'underworld' where the predominant technology is the one that establishes exclusion or inclusion. In this scenario these 'spaces', meant both as physical locations and virtual platforms, open up to new interpretations and tools able to discern the pandemic event.

The current boundary between analog and digital, which it is hoped can be transformed in one harmonious integration and interaction, is the field on which the paper intends to focus its attention trying to define a balance (trans and post pandemic) between the re-

appropriation of collective living and the preservation of the advantages widely demonstrated by the support that digital technologies can offer.

At this point the 'margin' may be defined as an opportunity for a *city in progress*, oriented towards a future in which the hybridization between phygital places and services may determine sustainable relapses in terms of time, resources and inclusion. In this scenario this paper, through a design-driven approach focused on society needs, is aimed to: re-read critically and with a positive sense the meaning of 'margin' as a field of development, also integration of digital-based technology and reassertion of the urban identity; foresee resilient dynamics for (digital) antifragile systems with aesthetical/inclusive characters, as well as system/services, necessary to make them efficient and representative of those physical places which they flank and support.

Elsa Negas

Researcher, Lusiada University - CITAD, Portugal

&

Rui Seco

Researcher, Lusiada University - CITAD, Portugal

Territorial Infrastructure: Drafting of a Calculation Evaluation Method

This study proposes a method for calculating the level of urban infrastructure and basic urban services on a given territory. It aims to contribute to a more accurate knowledge on the territory and the city, through the creation of an assessment tool for the urban condition, helping to overcome the imprecision that blocks reasoning, planning and urban management, according to Alain Bourdin (2010). A number of different disciplinary fields already created indicators that measure complex situations, comprising multiple factors with variable relative weights, from Climatology or Health to Social Responsibility. A method for the evaluation of the urban condition is here proposed, pondering significant items for its establishment. Urban infrastructure is here understood in a broad sense, integrating usual urban attributes - roads, pavements, electricity, water supply, sanitation, etc. - but also a set of urban services and equipments traditionally provided by city and urban environment - administration, representation, culture, health, education and security, among others - and also other conditions diagnosed as significant for the current evolutionary trend of extended urbanity, such as mobility - integrating roadways, public transport networks, soft mobility devices and infrastructures - and access to and integration in communication and information networks - voice and data communication, fix and mobile. The development of a calculation method takes into account different relative weights of this set of conditions, in order to obtain a balanced assessment of the level of infrastructure. In the future, testing its implementation in the field, in different geographic realities of the territory, will help to fine tune the balance of the items in the formula. It will then enable the use of the calculation method as an evaluation system, to produce analytic data that can then be cross-referenced with other indicators, like the development level, education level, unemployment rate or birth rate.

Anastasia Nikologianni

Postdoctoral Research Fellow, Birmingham City University, UK

How Can Landscape Architecture Influence Systemic Change to Achieve Sustainable Cities and Regions

This paper presents how the ideas of landscape, design quality and drawings can influence systemic change and result to sustainable cities and regions. The research related to this paper explores project frameworks and design methods in order to reveal innovative ways and processes for creating environmentally friendly cities and regions that will have the power to adapt and mitigate climatic phenomena of the future. Through a series of explorations on existing landscape projects and while using a series of stakeholder engagement workshops contacted at a Pan European level the paper examines ways that systemic change is possible and the outcomes it has in relation to the landscape. Using implemented and ongoing landscape projects such as the Room for the River (the Netherlands) and the West Midlands National Park (UK), the paper discusses how bold visions influence decision making and support systemic change in a spatial scale. Drawing on experience gained during a series of stakeholder engagement workshops, where the projects of the Tame Valley Wetlands Partnership (UK) and the Urban Farming and Growing Network (UK) were selected as case studies, the research presents key findings and lessons learned that can build capacity and improve the understanding and management of stakeholders when it comes to spatial planning and urban design. The paper argues that a new way of thinking in design, policy or governance is not enough if these disciplines act individually. The breakthrough comes when each discipline collaborates with the aim to future proof our cities and regions. By presenting pioneer examples and models working on tools for a systemic change, the paper aims to demonstrate that large scale developments can be brilliant examples of new methodologies applied and lessons learnt.

This research concludes that systemic change is represented across all levels, policy, decision making, governance, design and implementation if the aim is to deliver a sustainable city. The establishment of a cross sectoral, interdisciplinary and environment-focused project framework supported by policies and legislation can make a real difference in the way professional practice and politics deliver resilient concepts at a strategic level. The paper suggests that landscape design is an important driver towards a low carbon

transition, whilst at the same time can enhance social and landscape identity and boost the economy of a region.

Santiago Pindado

Professor, Polytechnic University of Madrid, Spain

PIRAMIDE, An Innovative Educational Program Based on Research: Some Results and Lessons Learned

By the end of 2019, the *Universidad Politécnica de Madrid* (UPM) granted support to the 1-year innovative educational program PIRAMIDE. This program aimed to boost academic results from Bachelor and Master students by doing research on space engineering. This program was coordinated by professors from the IDR/UPM Institute. The program was structured into five different case studies: 1) Design of a space mission (phase 0/A) in a Concurrent Design Facility (CDF); 2) Selection and study of an on-board computer for a CubeSat mission; 3) Intelligent design methodologies applied to graphic engineering; 4) Analysis of power systems for space applications; and 5) Design of a spacecraft Attitude Determination and Control Subsystem (ADCS). The program ended by the end of 2020.

In the present work, the most relevant results of PIRAMIDE are summarized. These results are classified into two different categories: results of the different case studies (work carried out), and perceived results, from both students and professors. Besides, a critical analysis is included with the lessons learned that might help to design better programs in the future.

Barbara Polo-Martin

Lecturer, Valencian International University, Spain

COVID-19: Cartography as a Witness of Change of Spanish Urban Models along History due to Sanitary Crisis

During centuries, the pandemics were something very natural to the human being, but as result of the industrialisation during the 19th century, they became a problem. The arrival of population to big cities provoked the development of irregular and overpopulated quarters with any measures of safety, and facilitated the expansion of tiny diseases. The problem resided in the sanitation's problems. As for example happened in London and Paris. As solution, in different cities, and as starter point Paris with the Haussman's proposals, different inner reforms and extension plans were made in Spain (Nadal, 2017, 357-385). Humanity believed that these extension plans would give us a healthy density and an ordered expansion. We opened with scalpel big boulevards to believe that we had a wide city to walk. But nothing further from reality. At the beginning of 20th century, the history repeats. A new pandemic crisis has raised and has shown that cities have, again, a crisis of congestion. But in this time, in comparison with 19th century, town halls have acted very quickly in order to enhance the welfare of their citizens. Green and out of cars cities. Cities for citizens and not for economy. Governments have known how to recover the previous state of the city and to promote spaces of quality. It is proposed that within 10 to 20 years cities are clean, green and car-free. The latest crisis, the COVID-19 one, has allowed to pedestrianize centres, to create cycle lanes, to increase the use of public transport, and all this, using few resources. Governments have used unique situations like this in which the city is transforming to achieve sustainable development. In cities such as New York Bay after the floods of Sandy, New Orleans after the hurricane, Paris with population's increase or Barcelona, Madrid or smaller Spanish cities with the COVID-19. The question that arises is whether the temporary experiment becomes permanent in the center. Crises make tangible changes, they invite governments and citizens to dream, a crisis to evolve, but the citizen has to be the main defender of these new changes, and not governments as on previous occasions.

Since the COVID-19, people have begun to talk about the architecture and urban planning of the confinement. Professionals say that confinement will mean a before and after. Some experts agree. He also agrees that perhaps the time has come to modify the way houses

are built and designed to also think about their interior layout. We have to find solutions so that, within them, we can also be abroad. The key is the transformations of urban structure, which is modify and whose changes can be seen through cartography. Digital maps, in the case of Spanish cities, provide a complete view of these changes developed during this pandemic: the cease of tourism houses, development of green and pedestrian areas, enlargement of cycle lanes or exclusion of cars. It is the old view of the city or the so-called "urban corruption" against the new one. Even among these changes, the perception about rural life, reviled by many in the face of the maelstrom of the big city, is more attractive these days.

Nicole Raddatz

Research Associate, University of Kassel, Germany

The Smartphone as a Participatory Response to Changes in the Understanding of Democracy and Planning of Transport Projects

Major projects, especially transport and infrastructure projects, are increasingly met with resistance. Petitions, demonstrations and occupations are chosen as a form of protest by civil society to express their displeasure with political decisions on transport projects. The resistance has different reasons. The decline in quality of life due to increased noise and air emissions as well as environmental damage are often cited. A core problem remains the release and communication of information about planning projects, including transport projects. A large part of the information receives too late, is incomprehensible and the entire planning process is non-transparent. In addition, participation procedures in the planning and implementation of transport projects aim to inform civil society and allow it to express its opinions. In the further course of planning, these opinions are taken into account. This is required by law. Whether and how a project is implemented is not the responsibility of civil society. In this regard there is a decisive change in society. The legal requirements for participation in a planning project have nothing to do with the real desire for democratic participation of the civil population. Citizens want to participate in decision-making, co-determination and co-design. However, there is movement: Informal participation formats complement the formal participation process, both analog and digital. The transparency of relevant information is to be achieved through supplementary information events and improved Internet presence. Exactly how these additional formats will be designed remains open. No criteria are formulated for the provision of information. This means that the project sponsor retains sovereignty over information. With the development of digital communication media at the beginning of the 21st century, online participation has been added. Studies show that the majority of online portals (including those for urban planning), especially those of municipalities, have been poorly user-friendly since at least 2005. Besides the classical online portals of municipalities, digital media, especially social media, are hardly used for planning procedures. The aim of this paper is to show what role online formats play for the formal planning process and whether they can be more than supportive for individual procedural steps in planning. In this

context, it will be examined which criteria (mobile) online formats, in particular the smartphone, must fulfill for active citizen participation. The smartphone has great potential to be informed about planning projects anytime and anywhere such as to participate in a consultation. The spectrum of mobile participation is wide and can be distinguished between user-based and location-based formats. On the one hand, this means that users can exchange information and organize themselves anywhere, quickly and easily. On the other hand, users become data providers or data recipients at specific locations. Thus, in addition to producing their own data, data is stored, information is generated and knowledge about spatial conditions is passed on. In the principle of Open Data, this means immense knowledge for further urban planning, administration as well as companies, and design.

Dani Sabalja

Assistant Professor, University of Rijeka, Croatia

Oil Pollution of the Mediterranean as a Result of Maritime Accidents

The Mediterranean Sea is one of the busiest seas in the world, harvesting 20% of seaborne trade, 10% of world container throughput and over 200 million passengers. Major traffic routes are dominated by crude oil shipments (that originate from the eastern Black Sea, Northern Egypt, or from the Persian Gulf via the Suez Canal) and by container ship traffic. From the mid-1990s to the mid-2000s, the Mediterranean Sea recorded a rise of 58% of transit capacity, combined with an increased size of vessels by 30% since 1997, and it is expected that shipping in the Mediterranean basin will increase in the coming years, both in number of routes and traffic intensity. The increase in maritime traffic is continuously increasing, and part of it is the transport of oil by sea. Increasingly dense sea traffic with larger and faster ships is also increasing the possibility of more maritime accidents that could result in oil pollution with catastrophic consequences for the environment. This paper would like to show the maritime accidents that occurred in the Mediterranean, their consequences as well as the measures taken after these accidents. The aim of this paper is to present the percentage of these accidents, indicate the trend and analyze the prescribed measures to prevent these accidents. The research will also show the possible correlation of older ships and maritime accidents with oil pollution. Since the Mediterranean is a closed sea, the research aims to obtain areas where marine accidents with oil pollution have occurred. What resources could be used, capacity of the assets, trained crew. Availability of additional resources and trained personnel. All countries in the Mediterranean are tourist countries and oil pollution of the coast would have unforeseeable consequences for the economy of these countries. In the case of oil pollution of the sea, the most important thing is timely action with appropriate equipment and trained personnel. The longer the response time, the longer and more expensive the removal process. The aim of this paper is to show the connection and action of the Mediterranean countries in the case of such maritime accidents. With a review of whether that is enough and whether it can be done better

Siavash Saki

Research Assistant, Frankfurt University of Applied Sciences, Germany
&

Tobias Hagen

Director, Frankfurt University of Applied Sciences, Germany

Clustering Urban Areas Based on GPS Trajectories and Geospatial Data

City segmentation, or more generally land classification, is a critical aspect of mobility management and urban planning. Due to the rapid evolution of the cities, the results of traditional manual city segmentation models become outdated quickly.

Using unsupervised machine learning algorithms, we propose a method to generate small local geographical units (LGUs) in urban areas and to cluster them. The method is based on geospatial data and GPS trajectories, which can be applied to a wide range of cities worldwide.

Geospatial data are retrieved from the OpenStreetMap database, and POIs are established and grouped. Additional POIs are defined using GPS trajectories based on their various attributes (e.g., starting points of journeys or parking locations of journeys). Next, the urban area is divided into LGUs. LGUs attributes are then defined based on POIs count, and clustering is carried out. Depending on the clustering's purpose, the cluster analysis can be done using either only geospatial data or only mobility data or a combination of both of them. Various clustering algorithms are tested in the process. For instance, the "k-means" algorithm has proven to be very effective for clustering geographical units. Besides, we build a model that enables the clusters to overlap, i.e., the boundaries between two types of districts do not have to be clearly separated but can be (more realistically) fluid (almost continuous). Currently, we are investigating two approaches for creating overlapping clusters. Firstly, a model-based clustering method based on count data distribution that estimates the posterior probability that an observation belongs to each cluster. The second approach is to build density estimation of different categories of POIs and then to aggregate the weighted density estimations.

"Geographical areas of the cities" could, for example, be district types such as business area, residential area, or commercial area, whereby the method proposed is also open concerning the number of different types found.

The method is applied and demonstrated using the example of the city of Hanau in Germany.

Francesca Salvetti
Adjunct Professor, University of Genoa, Italy
&
Michela Scaglione
Adjunct Professor, University of Genoa, Italy

The Graphic Expressive Forms of Resilience and Regeneration from Art to Historical and Contemporary Architecture

The document presents a theoretical study on resilience and regeneration terminologies, identifying their original use and their transmutation and use in architectural issues.

The first part includes an excursion on resilient architecture starting from the existing examples of the historical fabric to the new designs of resilient urban spaces. From new architectural anatomies to new distribution and construction schemes designed to cope with the new needs given by continuous traumatic events, in a direct confrontation. Architecture that becomes resilient and architecture that is born resilient. The paper also proposes a reflection on the graphic descriptive methods that document resilient design and the utopian design of cities as a collage. The drawing of architecture about resilience and the different forms generated.

The methodological approach highlights the multi-layer vision of the drawing that characterizes the vision of future cities through forms of a repetitive nature. From conceptual schematic maps to complex utopian representations of future scenarios.

Future research is the continuous recognition of human needs centred on historically and visually recognized identity for the creation of urban regeneration in continuous transformation starting from the drawing.

Sabine Scheel-Kopeinig

Senior Researcher, Frankfurt University of Applied Sciences, Germany

Tobias Hagen

Director, Frankfurt University of Applied Sciences, Germany

&

Siavash Saki

Research Assistant, Frankfurt University of Applied Sciences, Germany

**Start2Park Determining, Explaining and Predicting
Cruising for Parking**

When calculating travel time with navigation apps, the time needed to find a parking space is neglected. Therefore, the attractiveness of private car use compared to other means of transport appears higher than it actually is. Implementation of parking search time in navigation apps could reduce unnecessary parking search traffic. This would be associated with reductions in emissions, traffic volume, and travel time.

Moreover, previous studies show that parking search time (cruising for parking) has not been convincingly measured yet. This research project closes a research gap by precisely measuring parking search time based on collecting data via an app developed for this purpose. In particular, we are able to precisely determine the starting time of cruising for parking. In this way, average parking search times can be determined according to urban district types and time.

One research goal of the project start2park is developing a model to explain parking search time to identify public traffic-planning options. Moreover, a parking search time prediction model is developed in order to implement real-time forecasts of parking search time in navigation apps.

The start2park-App is developed in collaboration with our practice partner Fluxguide, Vienna and will provide a state-of-the-art mobile interface that is fine-tuned for ease of use while driving. The application will be rolled-out across platforms for both iOS and Android devices (publicly available from summer 2021). Value for users will be provided through reward systems and an intuitive user experience. Pre-test drives are currently being carried out, and initial descriptive and correlation analyses are being conducted.

App-based data will be combined with big data by our practice partner Bliq, Berlin. Using data mining and statistical analysis, cruising for parking will be explained by possible determinants, e.g., traffic density, date, and time. Using machine learning algorithms, a parking search time prediction model will be developed.

At the conference, the research project, the start2park-App, and results from pre-test-data are presented. The research project is funded by the German Federal Ministry of Transport and Digital Infrastructure and runs until mid-2023.

Miguel Silva Graca

Senior Researcher, CITTA-UC, Portugal

The Lisbon Story: Twelve Years of Public Participation Approaches, Mechanisms and Practices

Public participation is actually a widely diffused and recognized concept, being a mechanism currently applied by the Local Administrations in the elaboration of public policies or in the management of its relationship with citizens and communities.

As well as completely aligned with the Sustainable Development Goals (SDGs), set by the United Nations for the year 2030 – particularly SDGs 11, 16 and 17 – that establish that inclusive, accountable, participatory and shared decision-making should be practiced by local governments. And in fact, if properly applied, public participation allows the dialogue between stakeholders and decision-makers, more balanced and equitable decisions, and therefore an higher success and sustainability on the implementation of specific public policies.

This paper will precisely address the several public participation initiatives developed by the Lisbon Municipality in the last 12 years, and will try to analyse the different public participation approaches, mechanisms and practices that were used, as well as to evaluate at same time if the commitments established by the SDGs were achieved.

To start, we will look to a first phase of experiences on this field, that group participation tools like the Decentralized City Council Meetings or the Lisbon Participatory Budgeting, which started respectively in 2007 and 2008, and that are still functioning nowadays, but also to innovative local planning processes like the Local Housing Program (PLH), that conducted the first non-mandatory public consultation process, in 2008. Then to a second wave of local policies that will focus on co-production or co-decision processes, like the BIP/ZIP Program - Priority Intervention Neighbourhoods/Zones, implemented in 2011 and still working, or in co-thinking and co-defining processes, like the Forum for Citizenship, held since 2014. And finally to third phase of public participation policies, that are aimed not just to specific groups or themes, but also to the general public, like an online portal aggregating all the participation tools held by the municipality (LisboaParticipa), fully working since 2017, that gathers also several others tools, like Open Data databases, Online Public Consultation platforms or online applications to report occurrences that require intervention from the Lisbon Municipality.

But besides trying to address these particular approaches, mechanisms and practices of public participation, we will also try to validate the global relevance of its contribution regarding a better performance of the municipality itself, by creating a sustainable participatory ecosystem, and therefore providing a better public service and pursuing fairer public policies.

Nikoleta Slováková

PhD Student, Czech Technical University in Prague, Czech Republic

City on the Rails

The research focuses on the application of the elements of the theory of linear urbanism to the current solution for the rural settlements, from which life is lost and they are becoming open-air museums. Rural settlements are currently experiencing a crisis, most of their residents are moving to the big cities for work and in order to improve the quality of their life.

This work is inspired by utopian cities from the early 20th century, such as The Roadtown by Edward Chambless, Plan Obus by Le Corbusier or Green City by Konstantin Melnikov. Similar tendencies could be found in highly developed cities such as Tokyo. The book *Made in Tokyo* from the Bow-wow studio, has already mapped the use of those utopian tendencies in Tokio and tries to apply its forms to the existing typology of cities and landscapes.

The aim is not to put all the functions in one coxinglomerate, but rather to create a superorganism within the country. The superorganism consists of several settlements with insufficient facilities. The settlements are interconnected by railway, which already exists. The most important transformation is hidden in the utilisation of the transport infrastructure and in the further addition of the necessary facilities in such a way that the individual necessary points within the linear composition can be shared between multiple dwellings.

The starting point of the research is a critical look at current methods of chaotic construction and the creation of an unassuming superorganism within the country. The subject of the research is the methodology of work in the protected landscape area and restoring its attractiveness from the perspective of the current artistic concepts, technologies and strategies.

Liping Sun

PhD Student, Southeast University, China

&

Jing Liang

PhD Student, Southeast University, China

A Study of Architectural and Cultural Symbols along the Grand Canal - Centered on Merchant Buildings of Ming and Qing Dynasties

Since the Ming and Qing dynasties, with the great development of the commodity economy, the merchant community relying on the Beijing-Hangzhou Grand Canal for trade has been very active, and the prosperity of architectural culture has become a phenomenon that cannot be ignored. At the same time, Chinese traditional architecture has many symbolic features reflecting regional cultural characteristics in architectural layout, architectural decoration, architectural details and so on. This paper takes the Beijing-Hangzhou Grand Canal in the Ming and Qing dynasties as the main research vein, and selects typical canal cities along the Grand Canal - Hangzhou, Yangzhou, Tianjin. Focusing on related building types created by merchant groups in the late Ming and Qing dynasties in various regions, such as important guild buildings, residences, warehouses, etc. In this paper, through a typological analysis and study of relevant traditional architecture, I explore the recurring expressions of visualized graphics, patterns or symbolic signs and slogans. The project attempts to interpret the symbolic connotations of "cultural symbols" in architecture in the context of the different regional cultures in the north and south of China, to summarize the general patterns and typical characteristics of the cultural symbols of merchant architecture in typical cities along the Grand Canal, and to provide a tentative perspective for the visualization of canal heritage.

Rita Viliuviene

Ph.D. Student, Vilnius University, Lithuania

Cartographic Style Tendencies in News Maps

Towns and cities, as countries and regions each of them can face essential events that change their ordinary lives. Fatal and dramatic events are among them, but there can be joyful events also. The actuality appears among the breaking news category in the front pages of news portals and newspaper websites. It is natural to provide a map in the article. The community affected by the phenomenon could at a glance understand the scale of the problem from the map, the complexity of the situation, possible solutions. However, the reader is disappointed when the map is not presented in the article or the map is of the low communicative value.

This presentation examines news maps. The news is related to the events in geographical space and time, such as the fire at waste tire recycling plant in Alytus in October 2019 (Lithuania), Camp fire in California in November 2018 (USA) or an Indonesian aircraft crash with 62 passengers in January 2021.

The aim of the study is to review if maps on news portals and national newspaper websites are available and, if so, are there some specifics to map style depending on the audience and the function of the map.

To achieve the research goals, first of all the attention is focused to the world news flow geolocating map platforms as GDELT project www.gdeltproject.org/ or Freedom Forum www.freedomforum.org/ and map style tendencies are assessed. In the next stage of the functional stylistic cartographic analysis, the news maps are investigated in different online news resources. Maps are analyzed to the original functional style determination methodology there the map style is assessed according to several criteria as originality, expressiveness and decorativeness, taking into account the audience to whom the map is addressed, map function and map media.

The research results show that news maps are varying from simple and clear interactive maps to static, non-updated, non-professional cartographic visualizations that use an outdated technological map production scheme. The latter finding is a problem, especially in the countries where the national spatial data infrastructure is maintained.

It can be noticed that what news maps are the result of fast job. Often they are described as “preliminary” map. The journalists are often the first to record information on a map after the event, and only

much later when the information is registered and officially approved by the responsible authorities relevant official maps are published for public access. It is interesting that from the perspective of cartographic style, new cartographic methods and graphical signs may appear under stressed situations and it leads to style renewal.

In order to conclude, the problem is that much more breaking news articles need to be supplemented by the map and the news maps need to be styled in accomplishment with intended users and intended demands in mind in order to guarantee information communication in a qualified manner. As a result we can expect that the number of news maps will increase and the maps will be improved.

Linxing Wang

PhD Candidate, Southeast University, China

Research on a Value-Oriented Regeneration of Historical Districts: A Case Study of Qingdao Sifang Road Historical District

China's rapid urbanization process has destroyed the cultural heritage of many historical cities, and the evidence of historical development is no longer clear. The modern buildings and historical buildings in historical blocks are intertwined and blended with each other, and the urban characteristics gradually fade or even disappear. Qingdao is a famous historical and cultural city in China. It was colonized by Germany and Japan in history, leaving a rich historical heritage. However, there are some problems such as the desalination of historical districts and unclear values. As the space carrier of urban history and culture, the historical district is very important for the transformation and quality improvement of urban development. At present, the reuse of historical blocks in China pursues the restoration of appearance and the development of economy and industry but ignores the historical value, social value, and other values. This paper analyzes the problems of the transformation and utilization of traditional historical blocks and constructs the planning idea of the revitalization of historical blocks guided by the value remodeling. Combined with the planning practice of the historical and cultural block of Sifang road in Qingdao, and guided by the value orientation, this paper implements the whole planning process and puts forward some suggestions for the revitalization of historical blocks from the aspects of core value refining, function positioning planning, vitality space shaping and community crowd cultivation, in order to provide a reference for the protection and utilization of other historical districts in our country.

Taking Sifang Road Historic District in Qingdao as an example, this paper mainly has three questions: 1) what are the basic objectives and planning strategies of the value-oriented historic district revitalization; 2) what are the core values of Sifang Road Historic District; 3) how to realize the revitalization of the historic district according to the core values of Sifang Road Historic District?

The revival of the historic districts should be guided by multiple comprehensive values such as historical value, social value, and economic value. In the continuous planning logic process of development goal, functional orientation, space utilization, and

community cultivation, the planning method guided by core value should be implemented. Through the combination of history and contemporary needs, the value of historic districts should be reshaped to realize sustainable development.

Mathias Wilde

Professor, Coburn University Germany

&

Jakob Rebhan

Research Associate, Coburn University, Germany

Acceptance of Autonomous Shuttle Services by the Local Population: A Case Study in Three Small and Medium-Sized Cities

Autonomous shuttle services in public transport are becoming increasingly important (Sun et al. 2020; Golbabaie et al. 2020; Berrada et al. 2020). In Germany alone there are currently 26 research projects testing the use of autonomous shuttles in various contexts. With the new technology is connected the hope to extend the classic public transport and to maintain an adequate transport service even in times and areas of weak demand (Latham/Nattrass 2019). However, the technology and also the service are still in their infancy. In addition to the technical feasibility of autonomous driving, the development of sensor technology and the overcoming of the limits to operate in public spaces, the penetration of the technology will depend crucially on whether users will accept the new services (Paddeu et al. 2020; Winter et al. 2020).

The proposed paper addresses this problem of technology acceptance in the context of autonomous shuttle services in public transport at the societal level. The basis is an adapted Technology Acceptance Model to investigate the effects of factors influencing people in acceptance of autonomous shuttle services (cf. Nordhoff et al. 2020; Chen 2019). It substantially consists of the social dimension, considering narratives and expectations within society, structural aspects of potential users contemplating the existing knowledge in the field of autonomous mobility as well as the dimension of subject-related expectations regarding the technology and, in addition, shaping factors such as social influence and personal characteristics.

Based on this Technology Acceptance Model, we developed and conducted a standardized household survey. The study took place in Upper Franconia in the north of the German state of Bavaria – a predominantly rural area where autonomous shuttle services are about to begin operations in three small and medium-sized cities. We utilize a sample of more than 500 completed questionnaires. Overall, the results clearly show that the population is receptive towards the new autonomous shuttle services. Specifically, the results show that both

social influence and personal characteristics like the general interest in innovations positively correlate to perceived acceptance and therefore leading to use intention. Nevertheless, a small percentage of respondents also shows a contradictory attitude. The high financial input and the low maturity of the technology in particular leads to a skeptical attitude of some parts of the population. Recommendations for political and traffic planning issues can be derived from the findings of the acceptance study: Accompanying measures of public relations in advance and during the introduction of the service are crucial for its acceptance (cf. Hilgarter/Granig 2020; Roche-Cerasi 2019).

The proposed paper will discuss the adapted Technology Acceptance Model, present the results of the study and derive recommendations for measures for politics, administration and transport planning.