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KA-AU KNOWLEDGE ALLIANCE FOR ADVANCED URBANISM

VOLUME 6

MAPPING UTOPIAS

Co-funded by the Erasmus+ Programme of the European Union

ka_au Knowledge Alliance for Advanced Urbanism

RESPONSIVE CITIES
URBANISM IN THE EXPERIENCE AGE

DELIVERABLE 2.2
WORKSHOP SEMINAR 1 REPORT

MAPPING UTOPIAS

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FOREWORD // KNOWLEDGE ALLIANCE FOR ADVANCED URBANISM

THE PROJECT

The increasing availability of data creates new opportunities not only for the monitoring and management of cities, but also for changing the way we describe, understand and design them, challenging many fundamental assumptions of urban design and planning professions. In order to promote the innovative education and training that emerging technologies require, higher educational institutions together with industrial partners have created the Knowledge Alliance for Advanced Urbanism (KA-AU). KA-AU develops courses, symposia and an educational and training platform, offering participants an innovative education on planning and design. The group understands “Advanced Urbanism” as the sensitive integration of ICTs in cities, taking into consideration cultural heritage, environmental and social issues. “Advanced Urbanism” is about designing and planning processes, instead of just concrete artefacts, linking citizens, businesses and governments in a sustainable urban culture. “Advanced Urbanism” requires changing traditional design and planning practices towards a more open, collaborative and interdisciplinary approach.

KA-AU is co-funded by the Erasmus+ Programme of the European Union.

THE REPORT - Deliverable 2.1

This report describes the main findings of the First IAAC workshop, organized by IAAC in cooperation with the KA-AU partners.The First IAAC workshop is part of the KA-AU program WP2, Task 2.3.

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ABOUT
THE ORGANISERS

ABOUT THE SYMPOSIUM ORGANIZATION

The KAAU partners involved in the activity are:

- IAAC: in charge of the activity organization;
- DARTS: who has given a lecture during the course;
- MCRIT: who has given a lecture during the course;
- USP: who has been working during the students during a brainstorming session.

The final jury was composed by:

Aldo Sollazzo (IAAC), Chiara Farinea (IAAC), Mathilde Marengo (IAAC), Daniele Ingrassia (Fab Lab Kamp-Lintfort), Starsk Lara (Noumena), Luis Falcón (inAtlas), Andreu Ullied (MCRIT), Marite Guevara (MCRIT), Manuel Gausa (UNIGE), Andrea Caridi, (DARTS), Oliver Broadbent (USP).

Institute for Advanced Architecture (IAAC)
Barcelona, ES
www.iaac.net

IAAC is an international centre for research, education, investigation; one of its objectives is to develop multidisciplinary programmes that explore international urban and territorial phenomena. The Self-sufficiency Agenda, central to all research lines developed in IAAC, establishes the responsibility for confronting the process of global urbanization from multiscalar operations and through prototypes that promote environmental, economic and social sustainability.

Darts Engineering
Genoa, IT
www.darts.it

Darts Engineering develops Advanced Real-Time Systems, providing to customers ICT consultancy services, software development, system integration, customized solutions, and bookshelf services and technologies. Darts constantly invests in industrial R&D and experimental development activities in different fields. Since 2010, Darts strongly focused its R&D&I activities in two themes, core of the KAAU project: environmental monitoring and resilience of the territory, and valorisation of cultural heritage.

Useful Simple Projects (USP)
London, UK
www.usefulsimpleprojects.co.uk

USP is a consultancy company specialized in urban design and development. USP works with cities and delivery partners on major infrastructure and development projects to bring about broader sustainability outcomes. USP also run engagement programmes with urban planners, cities, universities and built environment professionals to encourage systemic, multidisciplinary and innovative approaches. USP works with clients in particular to ensure that ICT systems and data management can be used to solve urban development challenges from maintenance of assets and efficient use of resources, to community engagement and city mobility. For this project USP will partner with their sister company Think Up who is specialized in building learning and development programmes for the built environment. This includes through digital platforms and experiential learning. A key part of this work is to ensure that programmes have a long term impact and evaluate programme success.

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IAAC - MASTER IN CITY AND TECHNOLOGY // MAPPING UTOPIAS - SHAPING THE INVISIBLE CITY

MAIN TOPICS

The rise of artificial intelligence is introducing a new set of possibilities to map and describe the complex organism of the contemporary City. New species of robots are implemented in the urban context in order to perceive dynamic urban environments, decoding through computational sensors, the multiple layers of the urban shape. Machine learning, artificial intelligence, aerial robotics are all part of this new set of tools, which urban planners and designers are starting to manipulate.
This wokshop focus on introducing these instruments, triggering a critical discussion regarding the real implication of technology and data driven design in the definition of a future urban environment .

INTRODUCTION

2050 Will mark the ultimate shift towards Cities. More then 70% of the human population will live by then in urban clusters. This unprecedented condition will bring unprecedented challenges for Cities.
The increasing growth in terms of population will need to match increasing needs for energy, food production, mobility and much more.

The digital revolution is providing every day new instruments, offering urban planning strategies able to match the growing complexity of the urban environment. Technology and data are already producing an important impact, affecting crucial decision in the environmental context, the political scenario and the everyday life of millions of citizens.

This workshop wants to provide a hands on experience on data manipulation and mapping strategies, offering different levels of learning methods based on the implementation of aerial robotics, virtual reality, computer vision and machine learning. The ultimate goal is to empower our students on a mutliple set of tools and to critically question the usage and implication of those fascinating instruments , using a real case scenario as a test field: the Superilla in Poblenou.
The Superilla project claims the occupation of the public space by the people, to subvert the leading role that cars have had over the last 50 years. The project is part of the new Plan of Public Space and Mobility of District of Sant Martí, promoted and approved by the City of Barcelona.

INSTRUCTORS

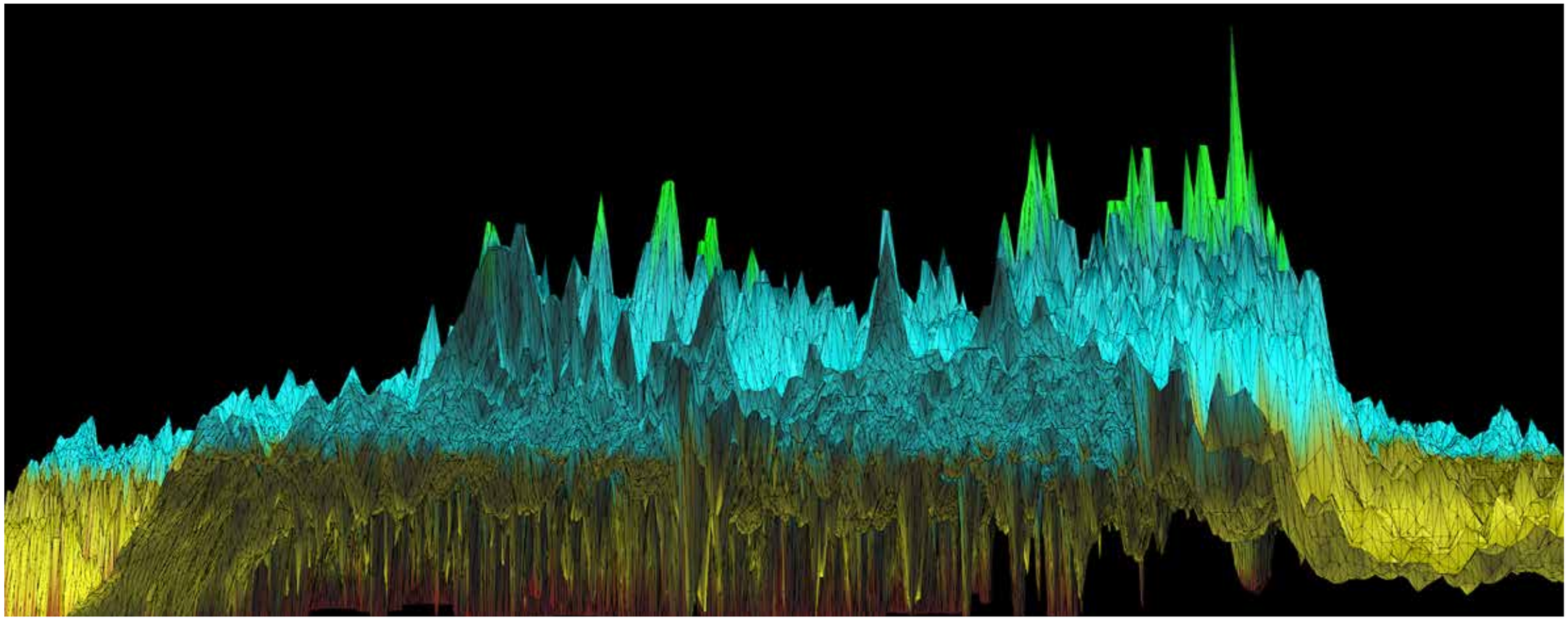
Aldo Sollazzo
Starsk Lara
Chiara Farinea
Daniele Ingrassia

STUDENTS

Abhignya Grandhi, Alex Mademo, Asier Eguilaz, Federica Ciccone, Frederick Ajjoub, Iacopo Neri, Laura Marcovich, Peng Wang, Pratyaksh Sharma, Sylvain Totaro

COLLABORATORS

Noumena
Fab Lab Kamp-Lintfort
Andreu Ullied (MCRIT)
Andrea Caridi, (DARTS)



METHODOLOGY

The methodology process is based on intense hands-on tutorials focus on multiple tools we believe will have an increasing impact in the future understanding of Urban organisms.

Our goal is to promote digital awarness, challenging the students to question reality through data-driven considerations.

Data can be gather in multiple ways. In fact, creating a custom data collection approach can nowadays be considered a crucial starting point of the design process itself.

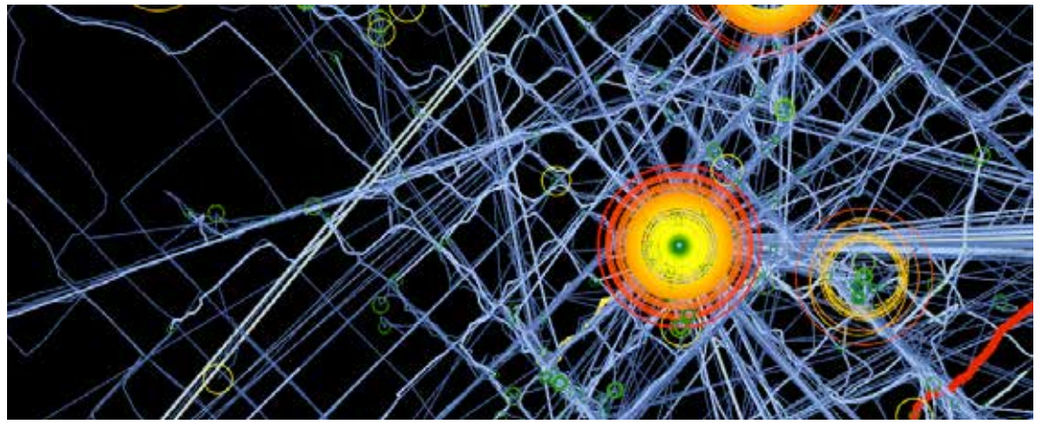
The tools used in this course are indeed built by designers responding to very specific needs, aiming to provide the simplest description of a very complex context condition.

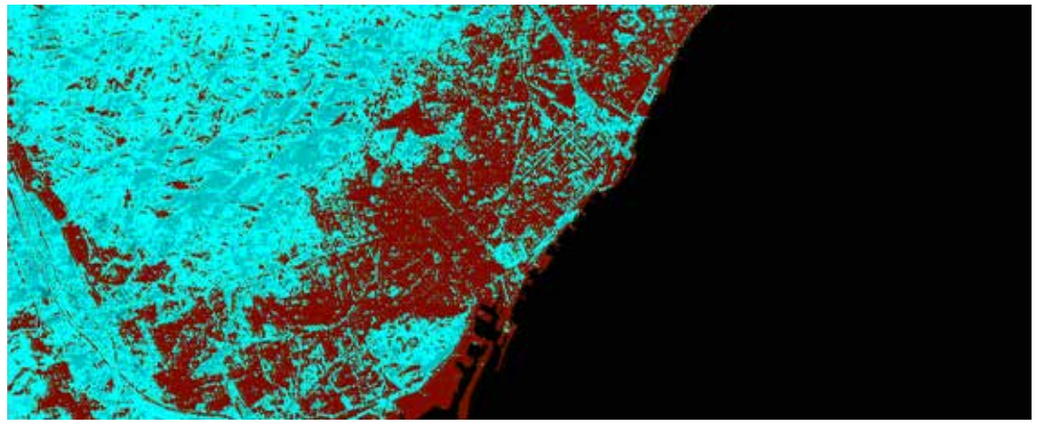
Which forces should be taken into consideration in order to define an Urban model?
How can we describe a city focusing on greenery, mobilty and public spaces?
How can we describe the blurry boundary between the digital and physical city?

This program wants to rise such questions while familiarizing students with computational and robotics instruments.

The course is divided into 5 modules:

1. **DATA TRACKING**
2. **NDVI DATA**
3. **AERIAL ROBOTICS**
4. **PEDESTRIAN DETECTION**





1 - DATA TRACKING

A tracking system is generally a system capable of rendering virtual space to a human observer while tracking the observer's coordinates. With this module we want to address how to look at mobility in a more informed way.

How can we describe the organic infrastructure of mobility of a City? How can data reveal through a behavioural model the different patterns of a city?

We focus on how to extract data collected by smart phones and overlap multiple informtion regarding calories, times, steps, mobility on a georeferenciated map.

We will be able to parse among different means of transportation, creating specific categories associated to machines, pedestrians, bycicle paths and running activities.

TOOLS

RHINO / GRASSHOPPER 3D
MOVE APP
PHONE TRACKING

2 - NDVI DATA / REMOTE SENSING

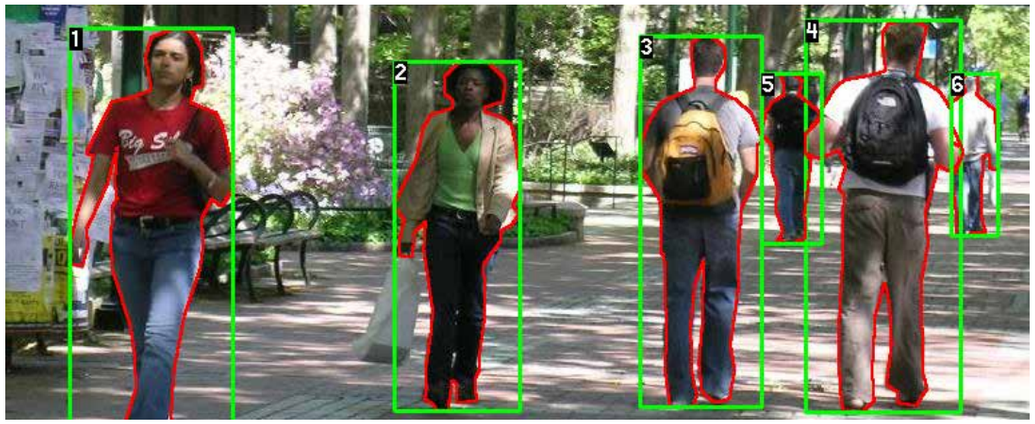
Shaping the invisible layers of an urban space requires precise methodologies based on the implementation of cutting edge technologies.

Satellitles are offering a very specific point of observation, through multispectral pictures. Using the different bands integrated in the filters of satellites cameras, we can actually detect crucial factors of a City organism ,such as the greenery infrustructure. Ndvi data, (Normalized Vegetation Index), is a graphical indicator that can be used to analyze remote sensing measurements ,simply and quickly identify vegetated areas and detect live green plants.

We will use a workflow connecting qGis and Rhino/Gh extracting NDVI data from multispectral pictures.

TOOLS

RHINO / GRASSHOPPER 3D
NERO GH LIBRARY
QGIS



3 - AERIAL ROBOTICS

Robots are no longer merely passive onlookers capturing information about an environment. They are now engaging with it in a meaningful way through an increasing understanding of their surrounding conditions.

Hacking robots, understanding their mechanisms, allows designers to reshape their functionalities and assign new capabilities.

In this module we will cover drones technology, learning how drones are made, from hardwares to electronics.

We will finally focus on how to program drones for autonomous flights for specific mission of data capturing. We will propose an open source workflow religing on non commercial drones and free softwares.

TOOLS

DRONE NERO
DRONE SATCHA KIT
PIXHAWK
MISSION PLANNER
AGISOFT

4 - PEDESTRIAN DETECTION

We can use computer vision to extract features to quantify the human body.

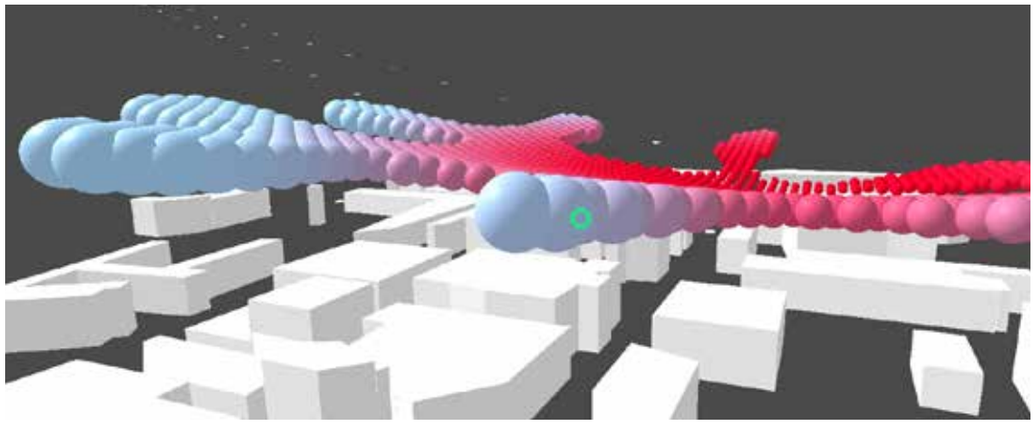
These features can be passed on to machine learning models that when trained can be used to detect and track humans in images and video streams.

This is especially useful for the task of pedestrian detection. With such a technology is indeed possible to count the amount of people in public spaces, detect their trajectories and reveal their behaviours.

In order to achieve those results, we will need to introduce computational methods based on the integration of machine learning libraries and computer vision strategies. OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision

TOOLS

PYTHON
OPENCV
MACHINE LEARNING
SCIKIT LEARN



5 - VR-EDGE / VIRTUAL REALITY DATA VIZ

Virtual Reality became a mainstream system able to generate parallel realities, where users can phisically interact in a digitally created environment. We proposed to use this tool as a Data Visualization instrument, embeding information in a digital version of the case study.

TOOLS

VR-EDGE
GRASSHOPPER3D
INTERNET

SUPERILLA / CASE STUDY

The Superblock is a new model of mobility that restructures the typical urban road network. With its implementation, Superblocks provide solutions to the main problems of urban mobility and improves both the availability and quality of the public space for pedestrian traffic. In order to achieve these goals for mobility, two fundamental changes must be made: modification to the basic road network and the establishment of differentiated routes for each mode of transport.

Superblocks are made up of a grid of basic roads forming a polygon, some 400 by 400 meters, with both interior and exterior components. The interior (intervía) is closed to motorized vehicles and above ground parking, and gives preference to pedestrian traffic in the public space. Though the inner streets are generally reserved for pedestrians, they can be used by residential traffic, services, emergency vehicles, and loading/unloading vehicles under special circumstances. The perimeter, or exterior, of Superblocks is where motorized traffic circulates, and makes up the basic roads.

PROGRAM /

PROGRAM

12th December 2016

DATA TRACKING

NDVI DATA / REMOTE SENSING

SPEAKERS

Andreu Ullied - MCRIT

Andrea Caridi - DARTS

Oliver Broadbent - USP

14th December 2016

AERIAL ROBOTICS

20th December 2016

AERIAL ROBOTICS

PEDESTRIAN DETECTION

21th December 2016

VR-EDGE / VIRTUAL REALITY DATA VIZ

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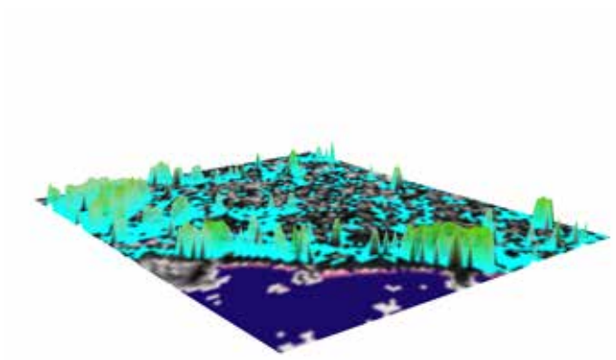
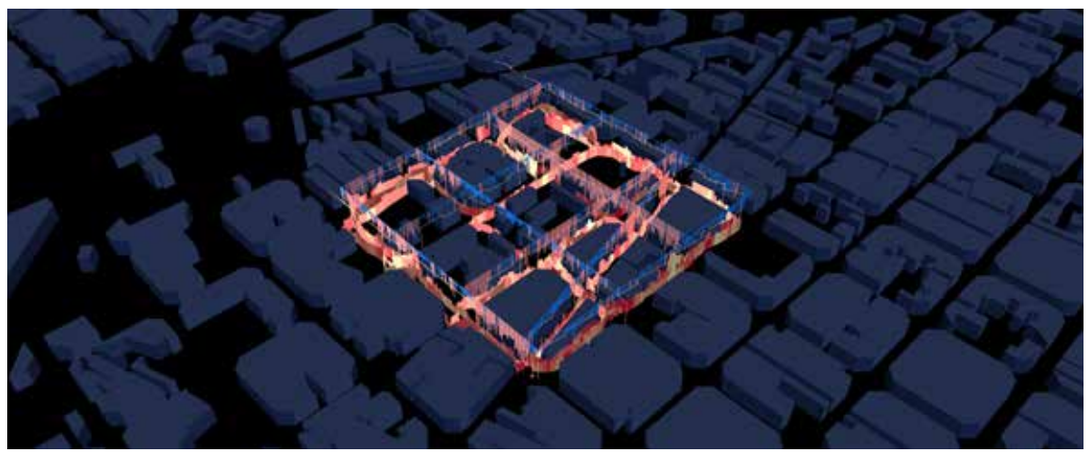
OUTPUTS

All students made a unique presentation covering all topics discussed over the course. Different groups were organized according to the 5 sections of the seminar. Aim of the presentation was to approach each data visualization process in a critical manner, offering a synthetic conclusion from the reading of it.





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CONCLUSIONS AND RECOMMENDATIONS

The seminar was an intense experience which allowed students to get familiar with many topics, around the common idea of developing a critical approach towards a data driven design process.
An important attention was give to familiarize students with the necessary instruments needed to convert data into information, using computation as a common ground.
Proposing such an heterogenic program was an ambitious task, which couldn't have been possible without the appropriate involvement of the students participating to the course.
The hands-on approach was fundamental to transmit all the concepts presented into the course. The students received a series of class tutorials associated to each of the modules presented in the course.
For each module we installed different softwares, mainly rotating around the platform of Rhino Grasshopper.

Many of the instruments were open source softwared, or built-in tools created by some of the collaborators in the project.

The instructors from IaaC were Aldo Sollazzo head of Visiting Program and expert in computation and Chiara Farinea head of European Projects. External collaborators were involved in the seminar, from Noumena the developer Starsky Lara and Daniele Ingrassia fab lab manager from Fab Lab Kamp-Linfort.
A special lecture from Lot Amoros, creator of Flone, introduced the topic of diy Drones through digital fabrication and laser cutting.

From the work presented from the students emerged the need of a deeper follow up on the knowledge provided. A critical approach was missing in many occasion, but the comments provided by the jury underlined its crucial importance.

In relation to the case study of Superilla, th students didn't always manage to reach a conclusion from the data visualizations produced.
It would have been probably better to extend the seminar, distributing the classes in a timeframe of one month, giving to the students more time to digest the information received.
As a final recommendation for a possible new iteration on this methodology would be not on reducing the amount of topics prensented, but on proportioning a more balanced timeframe among lectures and tutoring classes.

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CREDITS

MAPPING UTOPIAS was organized by: IAAC

Thanks to:

KA-AU partners:
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Chiara Farinea - IAAC
Luis Falcón - inAtlas
Manuel Gausa - UNIGE
Marite Guevara - MCRIT
Mathilde Marengo - IAAC
Oliver Broadbent - USP

Externals:
Daniele Ingrassia - Fab Lab Kamp-Lintfort
Starsk Lara - Noumena