

Press release

Vienna, 31.03.2023

AIT CoDeC-Symposium: AI-supported planning of cities brings diverse planning scenarios and new solutions

- AIT presents the results of the research programme Cognitive Urban Design Computing (CoDeC)
- City Intelligence Lab: International showcase laboratory for the use of digital urban planning methods

On 30 March 2023, around 100 international experts discussed the results of the five-year research programme Cognitive Urban Design Computing (CoDeC) at a high-profile symposium in Vienna.

The focus of the project was the innovative approach to develop a planning platform with the use of artificial intelligence (AI) and machine learning for urban development. In 2019, the City Intelligence Lab (CIL) was opened as part of the project as an international AI-supported showcase lab and further developed under the approach of co-creative development - co-creation of new knowledge. The methods have already been used in research projects for simulations of mobility, energy and climate issues in urban or neighbourhood planning. In addition, the project was scientifically accompanied in the Principal Scientist Programme.

Wolfgang Knoll, Managing Director of the AIT Austrian Institute of Technology:

"The cities of the future must not only be equipped with smart technologies, but must also be consistently planned digitally - from the building to the neighbourhood. With the development of digital urban planning methods, the CoDeC programme set new international standards with the City Intelligence Lab. This success was also made possible by the fact that the AIT Principal Scientist Programme involves internationally outstanding research personalities, such as Reinhard König in this case, in the realisation of excellent flagship projects envisaged in our strategy."

Wolfgang Hribernik, Head of Center for Energy, AIT Austrian Institute of Technology:

"The innovation achievement of future urban planning will be to use digital technologies to create diverse planning scenarios that offer a wide range of solutions for cities and their inhabitants. The CoDeC programme has already developed new applications for climate models in recent years that address the increased complexity of urban planning and the challenges of climate change."

Angelos Chronis, Head of City Intelligence Lab, AIT Austrian Institute of Technology:

"Our platform can create diverse planning scenarios in a very short time with the use of artificial intelligence and big data. To make cities more climate resilient, new methods are needed to best evaluate the requirements and challenges. We use machine learning to create microclimate simulations for summer and heat days with and without adaptation measures, to develop different climate models, to create wind simulations, to solve questions about mobility and finally to visually

prepare the results. This way you can immediately see which measures would mean an improvement for certain parts of the city."

Cognitive Urban Design Computing (CoDeC) Programme

The five-year CoDeC programme was a project led by Principal Scientist Reinhard König with the aim of developing an intelligent digital planning method that enables data to be transformed into information and knowledge so that cities can be planned more intelligently to make them more liveable, sustainable and resilient.

"The challenge was to combine machine learning approaches with available simulation methods using artificial intelligence," explains Reinhard König, Principal Scientist and Jun-Professor Bauhaus University Weimar. The main outcomes of the project are integrated planning, the involvement of citizens and stakeholders in the planning process and the development of digital planning tools. It also includes methods for predicting quantitative, qualitative and subjective impacts of urban interventions, even in the absence of explicit models. Furthermore, the results have enabled a new digital semi-automated planning approach that can facilitate backcasting strategies.

City Intelligence Lab – digital urban planning

The City Intelligence Lab (CIL) has been an integral part of AIT's expertise in the field of "Digital Resilient Cities" since 2019 and is the result of the CoDeC programme. The lab is an interactive platform for the holistic examination of the effects of a wide range of measures in urban and neighbourhood planning on mobility, energy and climate issues. Complex interrelationships of urbanisation and climate change are visualised in real time using artificial intelligence methods and prepared for the co-creative process with stakeholders and citizens in a target group-specific manner. On the one hand, existing designs can be evaluated extensively, and on the other hand, numerous automatically created design approaches can be compared in a performant manner using key performance indicators via a parametric design. This new digital process enriches the traditional urban development process in all planning phases. <https://cities.ait.ac.at/site/>

Project examples

InFraReD enables holistic mobility planning

Intelligent Framework for Resilient Design (InFraReD) is an artificial intelligence interactive online platform of the City Intelligence Lab that can simulate and plan mobility in urban planning for existing and new buildings in a holistic way. The platform makes it possible to analyse the interplay of building structure, accessibility, source and destination locations in an integrated way in order to run through hundreds of variants for the planning process within a very short time. For example, mobility and accessibility simulations can ensure that a new city district is designed in such a way that citizens can walk in 15 minutes ("15-minute city") without having to use a car at all, but can comfortably walk, cycle and use public transport in their daily lives.

AI-controlled wind flow simulation for digital urban planning

In the City Intelligence Lab, an artificial intelligence-based simulation for wind flows was developed. This makes it possible to determine wind factors in planning within seconds, which means that

designs can be analysed and optimised in every planning phase in real time, taking wind factors into account. Wind flows are very important in times of extreme weather conditions in terms of dangerous speeds during storms, but also for fine-tuning the microclimatic conditions of a neighbourhood. Thus, in planning, those areas with potentially dangerous wind speeds during storms can be localised and the influence mitigated. In addition, the results can be used to fine-tune the microclimatic conditions of a neighbourhood - whether to cool it down or to keep it warm.

Parametric model for Frankfurt

The AIT Center for Energy, together with the renowned Frankfurt architectural firm Albert Speer & Partner, drew up the Frankfurt High-Rise Development Plan 2021. The plan provides for the examination and definition of new and existing high-rise locations. Not only were the city silhouette and urban development qualities evaluated, but the suitability of the locations was also considered from a climatic and traffic perspective. The use of parametric models in this project represented a paradigm shift compared to traditional design processes for high-rise developments. For the development of the Frankfurt skyline, several planning variants and scenarios were created within a very short time. This brought enormous added value for the client, the city of Frankfurt, as the high-rise sites could be subjected to a complete performance overview and performance at the very beginning.

AIT Center for Energy

At the AIT Center for Energy, around 270 employees are researching solutions for the sustainable energy supply of tomorrow under the direction of Wolfgang Hribernik. The many years of experience and scientific excellence of the AIT experts as well as the high-quality laboratory infrastructure and global networking offer companies innovative and applied research services and thus a clear competitive advantage in this future market. The Center for Energy's topic portfolio is oriented towards three central systems: sustainable public energy supply, decarbonisation of industrial processes and plants, and innovative technologies and solutions for urban resilience (buildings, cities).

More information about the Center: <https://www.ait.ac.at/energy>

AIT Principal Scientist Programme

Principal Scientists play an outstanding role in the AIT's scientific career model. They are internationally recognised experts with outstanding scientific careers who have a significant influence on the strategy of their research areas. They focus on establishing, strengthening and networking the scientific core competencies of the AIT. As a strong and visible node in international scientific networks, they are initiators of the strategic development of research collaborations with universities, other research institutions and companies and contribute to shaping national, international and European F&E.

Press photo



BU: An interactive demo of the City Intelligence Lab took place as part of the CoDeC Symposium. © AIT_Chronis. Vienna

More pictures of the event: <https://www.ait.ac.at/news-events/single-view/detail/7643?cHash=174b55d12b91449f006686496ae2aa1e>

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