Centre for Urban Systems (CUS) - Knowledge Base

Organization Overview

Centre for Urban Systems (CUS) is a research center at Mohammed VI Polytechnic University (UM6P) dedicated to research, education, and innovation in urban sciences. The center uses Living Labs as research and training environments to train future urban leaders and find innovative solutions to complex urban problems.

Contact Information

- **Email**: contact.cus@um6p.ma
- **Location**: Lot 660, Hay Moulay Rachid, Ben Guerir 43150, Morocco
- **Website**: https://cus.um6p.ma

Vision

CUS aims to become a leader in education, research, and innovation in urban sciences by:

- Using Living Labs to train future urban leaders and find innovative solutions to complex urban problems
- Improving urban management and citizen well-being by transforming data collected by Living Labs to make them sustainable, viable, supportive, and profitable
- Training the next generation of urban systems engineers
- Stimulating reflection on Moroccan and African cities
- Promoting excellence in urban systems engineering

Strategic Integration

The vision integrates theory, project management, expertise, and innovation, focusing on contemporary urban development challenges. This integration encompasses not only urban innovation but also extends to innovative approaches in teaching, aligning with the digital, data-driven, and quantitative orientation of urban studies research in Africa.

Mission

CUS is a center dedicated to research, education, and innovation in the field of urban sciences. The center focuses on four pillars:

1. **Research**: Conducting cutting-edge research in urban systems
2. **Education**: Training future urban systems engineers and leaders
3. **Expertise**: Providing expert consultation on urban challenges
4. **Innovation**: Developing innovative solutions for complex urban problems

All pillars aim to improve urban management and citizen well-being. CUS transforms data collected by Living Labs to make them sustainable, viable, supportable, and economical.

Global Context & Challenges

Demographic Surge in Africa

Over the next two decades, Africa (particularly sub-Saharan Africa) will experience a very strong demographic surge:
- More than **860 million new city dwellers** expected
- Population and surface area of cities will **double in one generation**
- This represents a major challenge, both spatially and socially
- While urbanization is a global trend, the challenges will be greatest on the African continent

Digital Revolution

A new urban revolution - the digital revolution - is profoundly transforming the way we manage and design cities:

Opportunities:
- New types of data (perception, real-time, opinions, ideas)
- New quantity of data (big urban data)
- Over 90% of the world’s data has been produced in the last 2 years

Challenges:
- When it comes to urban issues, vast quantities of data are produced, but nobody - or almost nobody - knows how to process it or understand its potential
- Tools are sorely lacking
- The most innovative projects in urban data show a fascination for methods and technology, while citizens tend to drift further away: ever more connected, but ever more distant
- The social question is a priority - we need to put technology back at the service of city-dwellers, not the other way round

Professional Gap

Currently, these digital issues for cities are taking place in a context where:
- Professionals are poorly structured, poorly trained, and few in number
- Unable to meet the growing challenges posed by digital urbanization
- The city is cruelly lacking in reflection, professionals, tools, and innovation
- Traditional urban management will soon be outdated and a need for reinvention is necessary
- New professions are appearing without cities being able to take them into account in their practice

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Objectives

Specific Objectives

1. **Train future urban actors** capable of responding to the challenges that await space professionals in a digital revolution

2. **Become the place of reflection** on current and future Moroccan cities and on the entire African continent

3. **Promote excellence** in urban systems engineering by structuring the actors in the field

Strategic Objectives

- **Change the angle of view** of urban studies research in Africa by positioning research in digital, data, and quantitative fields with a societal viewpoint, giving it added value compared to other research on the continent and in the discipline of urban studies
- **Test new methods** and put big data at the center of reflections on resolving complex urban problems, gaining visibility through innovative methods
- **Position the polytechnic vision** as a central element of the center
- **Form future urban actors**, reflect on cities in Morocco and Africa, and promote excellence in urban systems engineering

Implementation Requirements

To achieve these objectives, it is necessary to first:
- Establish the ecosystem necessary for a center of urban studies
- Train future teachers
- Position itself on the international scene

Research Topics

CUS focuses on the following research areas (non-exhaustive list):

Core Research Areas

1. **Digital Development**
   - Urban digital transformation
   - Smart city technologies
   - Digital infrastructure

2. **Resilient Infrastructure**
   - Climate-resilient urban systems
   - Disaster risk management
   - Infrastructure sustainability

3. **Smart and Sustainable Cities**
   - Sustainable urban planning
   - Green infrastructure
   - Urban sustainability metrics

4. **Smart Mobility and Transportation**
   - Intelligent transportation systems
   - Sustainable mobility solutions
   - Urban mobility planning

5. **Smart Energy Systems**
   - Urban energy management
   - Smart grids
   - Renewable energy integration
   - IoT applications in energy

6. **Health and Comfort Inside Buildings**
   - Indoor environmental quality
   - Building performance
   - Occupant health and comfort
7. **Food Security and Urban Agriculture**
   - Urban farming systems
   - Food supply chains
   - Agricultural sustainability
8. **Spatial Public Health**
   - Urban health geography
   - Health inequalities
   - Territorial health planning
9. **Environmental Modeling and Monitoring**
   - Environmental data science
   - Climate modeling
   - Pollution monitoring
   - Remote sensing applications

Expected Outcomes

CUS aims to achieve the following outcomes:

1. **New collaborative policies** for territorial development, mobility, and health
2. **Production of a new standard** in urban data management and analysis
3. **Innovation and global excellence** in the field of urban studies
4. **Contribute to the dynamics** of human development of Moroccan and African society
5. **Continental leadership** - The Center becomes a continental leader in the development of urban management products
6. **International platform** - The center becomes an international platform where African researchers, but also from other continents, will come to spend a few weeks, months, or even years in a stimulating environment
7. **Training of high-level researchers** who will be able to teach in the future School of Urban Systems and in other universities

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Team Members

CUS has assembled a multidisciplinary team of researchers and professionals specializing in various aspects of urban systems:

Research Scientists & Postdoctoral Researchers

Dr. El Bachir DIOP

- **Position**: Research Scientist
- **Specialization**: Sustainable Mobility and Intelligent Transportation Systems
- **Degree**: PhD in Transportation Systems Engineering
- **Profile**: https://cus.um6p.ma/team/Dr.-El-Bachir-DIOP/?id=64fb2871199f9b95c522cc96

Dr. Rida AZMI

- **Position**: Research Scientist
- **Specialization**: Spatial data science and urban data management
- **Degree**: PhD in Geomatics
- **Profile**: https://cus.um6p.ma/team/Dr.-Rida-AZMI/?id=64ff3e13199f9b95c522cd4b

Dr. Seyid Abdellahi EBNOU ABDEM

- **Position**: Research Scientist
- **Specialization**: Applied statistics, data science, probability, and smart cities
- **Degree**: PhD in Statistics
- **Profile**: https://cus.um6p.ma/team/Dr.-Seyid-Abdellahi-EBNOU-ABDEM/?id=6549fd5f199f9b95c522d70f

Dr. Mohammed HLAL

- **Position**: Postdoctoral Researcher
- **Specialization**: Urban Planning, GeoAI, and Urban Risk Management
- **Degree**: PhD in Geomatics Applied to Disaster Risk Management
- **Profile**: https://cus.um6p.ma/team/Dr.-Mohammed-HLAL/?id=659e67d1199f9b95c522e539

Dr. Mariem BOUNABI

- **Position**: Postdoctoral Researcher
- **Specialization**: AI applications for urban systems, with a focus on predictive maintenance of urban infrastructures
- **Degree**: PhD in Computer Science and Artificial Intelligence
- **Profile**: https://cus.um6p.ma/team/Dr.-Mariem-BOUNABI/?id=65cb8c6e0a5a02195e165fe7

Dr. Mohamed Adou SIDI ALMOUCTAR

- **Position**: Postdoctoral Researcher
- **Specialization**: Climate Change
- **Degree**: PhD in Earth and Built Environment Science and Engineering
- **Profile**: https://cus.um6p.ma/team/Dr.-Mohamed-Adou-SIDI-ALMOUCTAR/?id=67e3dfc0b45a9a9bb3e06dbd

Dr. Maryem ISMAILI

- **Position**: Postdoctoral Researcher
- **Specialization**: Remote Sensing, GIS, and AI for Land Degradation and Restoration
- **Degree**: PhD in Geomatics and Environmental Geosciences
- **Profile**: https://cus.um6p.ma/team/Dr.-Maryem-ISMAILI/?id=686d051f29a40f8f675a8bc6

Dr. Karima Nifa

- **Position**: Postdoctoral Researcher
- **Specialization**: Data Science, Geoinformatics, and Hydrology

- **Degree**: PhD in Geology
- **Profile**: https://cus.um6p.ma/team/Dr.-Karima-Nifa/?id=686d228829a40f8f675a8c66

Dr. Ayoub LAHLOUH

- **Position**: Postdoctoral Researcher
- **Specialization**: Urban Health, GIS, and Territorial Development
- **Degree**: PhD in Geography
- **Profile**: https://cus.um6p.ma/team/Dr-Ayoub-LAHLOUH/?id=68a312ac29a40f8f675b691e

Dr. Hamza KHARTI

- **Position**: Postdoctoral Researcher
- **Specialization**: Renewable energy, sustainable waste management, and wastewater treatment
- **Degree**: PhD in Environmental Science
- **Profile**: https://cus.um6p.ma/team/Dr.-Hamza-KHARTI/?id=68a3136429a40f8f675b6927

Dr. Bouali ET-TAIBI

- **Position**: Postdoctoral Researcher
- **Specialization**: Urban energy management, smart grids, renewable energies, and IoT
- **Degree**: PhD in Electrical Engineering and Renewable Energies
- **Profile**: https://cus.um6p.ma/team/Dr.-Bouali-ET-TAIBI/?id=68a342b429a40f8f675b69ec

Dr. RAFIKA Brahmi

- **Position**: Postdoctoral Researcher
- **Specialization**: Digital Twins
- **Degree**: PhD in Electrical Engineering
- **Profile**: https://cus.um6p.ma/team/Dr.-RAFIKA-Brahmi/?id=68af743f29a40f8f675b6e65

Dr. Kharbach Oussama

- **Position**: Postdoctoral Researcher
- **Specialization**: Territorial Inequalities and Spatial Justice
- **Degree**: PhD in Geography and Territorial Planning
- **Profile**: https://cus.um6p.ma/team/Dr.-Kharbach-Oussama/?id=68c2952129a40f8f675bb9fa

Support Staff

Rim Merini

- **Position**: Project Management Officer
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Ayoub REGRAGUI

- **Position**: Fullstack Developer
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Nor-Eddine Farsa

- **Position**: Content Creator
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Publications

CUS actively publishes research findings in various domains. Recent publications include:

Featured Publication

Title: Integrating Socioeconomic and Community-Based Strategies for Drought Resilience in West Pokot, Kenya

Authors: Jean-Claude Baraka Munyaka, Seyid Abdellahi Ebnou Abdem, Olivier Gallay, Jérôme Chenal, Joseph Timu Lolentum, Milton Bwibo Adier, and Rida Azmi

Publication Date: 14 Jul 2025

Access: Available on the CUS publications page at https://cus.um6p.ma/publications

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Key Differentiators

What Makes CUS Unique

1. **Living Labs Approach**: Using real-world urban environments as research and training laboratories
2. **Data-Driven Focus**: Positioning research firmly in digital, data, and quantitative fields while maintaining a societal perspective
3. **African Context**: Specifically addressing the unique challenges and opportunities of African urbanization
4. **Multidisciplinary Integration**: Combining expertise from geomatics, AI, statistics, engineering, geography, environmental science, and more
5. **Practical Application**: Focus on creating actionable solutions and new standards in urban data management
6. **Capacity Building**: Training the next generation of urban systems engineers and researchers
7. **International Collaboration**: Creating a platform for researchers from Africa and other continents to collaborate

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Strategic Positioning

Continental Leadership

CUS positions itself as a continental leader in:
- Urban data science and management
- Digital urban transformation
- Sustainable urban development
- Urban systems engineering education

International Recognition

The center aims to be recognized internationally for:
- Innovative methodologies in urban research
- Excellence in urban systems engineering
- Contribution to African urban development
- Training high-level researchers and practitioners

Institutional Affiliation

Mohammed VI Polytechnic University (UM6P)

CUS operates as a research center within UM6P, benefiting from:
- University infrastructure and resources
- Academic partnerships and networks
- Research funding and support
- Access to interdisciplinary expertise

Future Directions

Short-term Goals

- Establish the ecosystem necessary for a school of urban systems
- Train future teachers and researchers
- Expand research collaborations

Long-term Vision

- Become the reference center for urban studies in Africa
- Create new standards in urban data management
- Influence urban policy across the continent
- Train thousands of urban systems professionals
- Establish a global network of urban research excellence

This knowledge base was compiled from official CUS documentation and website content (https://cus.um6p.ma) as of October 2025.