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The United Nations Innovation Technology Accelerator for Cities (UNITAC-Hamburg) is an innovation lab based in Hamburg, Germany, established in 2021 as a partnership between the United Nations Human Settlements Programme (UN-Habitat), the UN Office of Information and Communications Technology (OICT) and HafenCity University (HCU).

The lab is funded by the Government of Germany. UNITAC-Hamburg is part of UN-Habitat's People-Centred Smart Cities Flagship program, which provides strategic and technical support on urban digital transformation to national, regional and local governments.

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Addressing the global housing crisis with innovation

What are the challenges?

Adequate housing is fundamental to human dignity, equal opportunities, and sustainable urban development. It is a cornerstone of social inclusion, economic productivity, and environmental sustainability. Yet, ensuring access to adequate housing for all remains one of the most pressing and persistent challenges facing cities and human settlements worldwide.

Today, an estimated **2.8 billion people worldwide** live without access to adequate housing, including nearly **300 million people experiencing homelessness** and **1.12 billion living in slums or informal settlements**. In these contexts, secure tenure, basic services, and adequate infrastructure remain limited.¹ Without coordinated, integrated and people-centred responses, housing needs are expected to intensify further, driven by rapid population growth and urbanization, forced displacement, climate-related risks, and increasing economic pressures.²

UNITAC's response

Addressing housing deficits and upgrading informal settlements can significantly improve living conditions, strengthen social inclusion, and expand access to equal opportunities for millions of people. Inclusive, data-informed, and people-centred approaches can guide such transformations, helping to strengthen urban resilience, reduce inequalities, and support sustainable urban development.

The United Nations Innovation Technology Accelerator for Cities (UNITAC) supports cities and communities in using data, spatial analysis, and innovative digital tools to better understand urban dynamics, plan inclusive upgrading, and co-design urban solutions that leave no one behind.

¹ Sustainable Cities and Communities, Goal 11 (United Nations Statistics Division)

² UN-Habitat New Strategic Plan 2026-2029

Leveraging AI to support informal settlement upgrading

Many cities worldwide are experiencing a rapid growth of informal settlements. To enable inclusive urban planning and informal settlement upgrading, these areas must be reflected in official municipal records. Yet informal settlements evolve quickly, expanding and reshaping in dynamic ways that are difficult to capture. Traditional, manual mapping approaches are costly, resource intensive, slow, and often outdated upon completion. This lack of timely, reliable data constrains effective urban planning, infrastructure delivery, and disaster risk reduction.

In response, UNITAC developed the **Building and Establishment Automated Mapper (BEAM)**.^{*} BEAM is an AI-based tool that uses machine learning to automatically detect building footprints and structures from aerial and satellite imagery, providing cities with timely, high-resolution spatial data to support inclusive urban planning and informal settlement upgrading.

^{*}With support from the German Federal Foreign Office

Selected applications:

eThekweni Municipality, South Africa: BEAM was developed to support land monitoring and strengthen municipal spatial data management. The tool mapped 1,530,546 residential and non-residential building footprints, reducing mapping time from months to 72 hours.

City of Cape Town, South Africa: An enhanced version enabled the distinction between formal and informal structures, including informal dwellings located in backyards of formal housing. BEAM detected 822,390 additional building footprints that were integrated into the municipal geographic database.

8 Central American cities (with UN-Habitat Mexico): BEAM was applied in Guatemala City, Tegucigalpa, Belize City, San Salvador, Santo Domingo, San José, Managua, Panama City to analyse the spatial and morphological characteristics of informal settlements. In this process BEAM identified 6,324 informal areas and mapped 550,776 buildings across all cities.



Key outcomes

- Faster urban mapping: reduced building and settlement mapping from months to days.
- Stronger municipal data systems: Integration of building footprints enhanced municipal geospatial databases and improved differentiation between formal and informal structures.
- Better evidence for inclusive planning: Large-scale mapping and analysis of informal settlements provided actionable data to support planning, infrastructure provision, and upgrading efforts.

Additional UNITAC tool for housing:

GeoVisualiser is a tool designed for use in low-resource digital environments developed by UNITAC to address digital infrastructure gaps faced by some local authorities.

It enables urban planners and stakeholders to open, explore and analyse spatial data without dedicated server capacity or data structures that constrain data sharing and reuse, facilitating quicker access to insights and more effective collaboration.



Become a UNITAC partner

-  **Collaborate** on challenge-driven projects co-created with local partners
-  **Build skills and strengthen** local capacities for ethical, inclusive digital technology use
-  **Advance** your digital transformation strategies, policies and processes
-  **Enhance** urban planning, services or governance through digital innovation and data