The Role of the Hipervisor Curitiba in Implementing PlanClima's Climate Actions

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City of Curitiba
Institute for Research and Urban Planning of Curitiba | IPPUC

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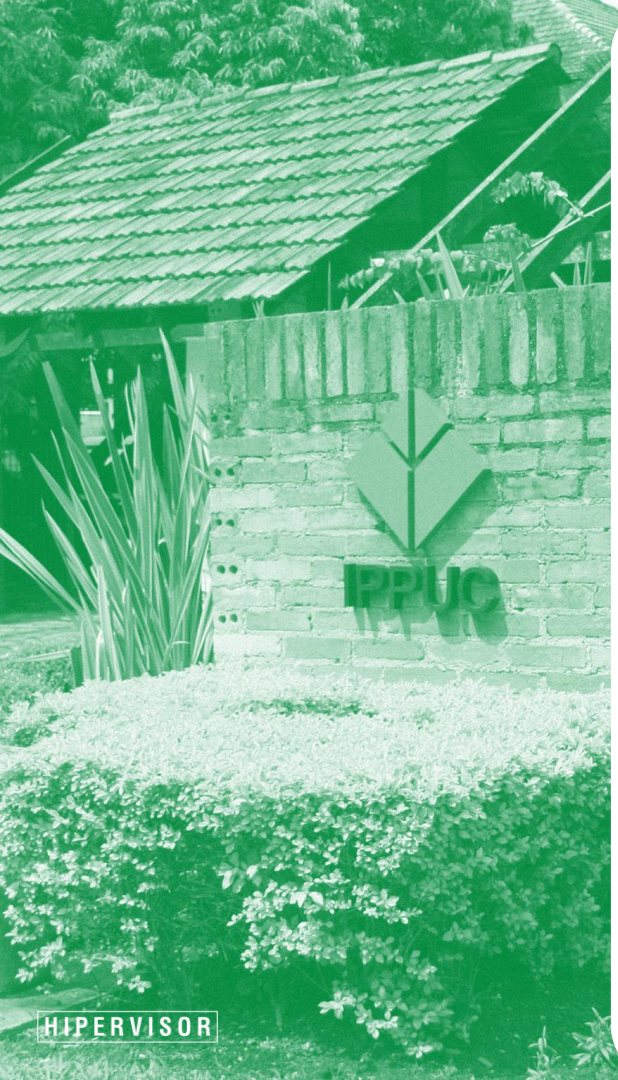


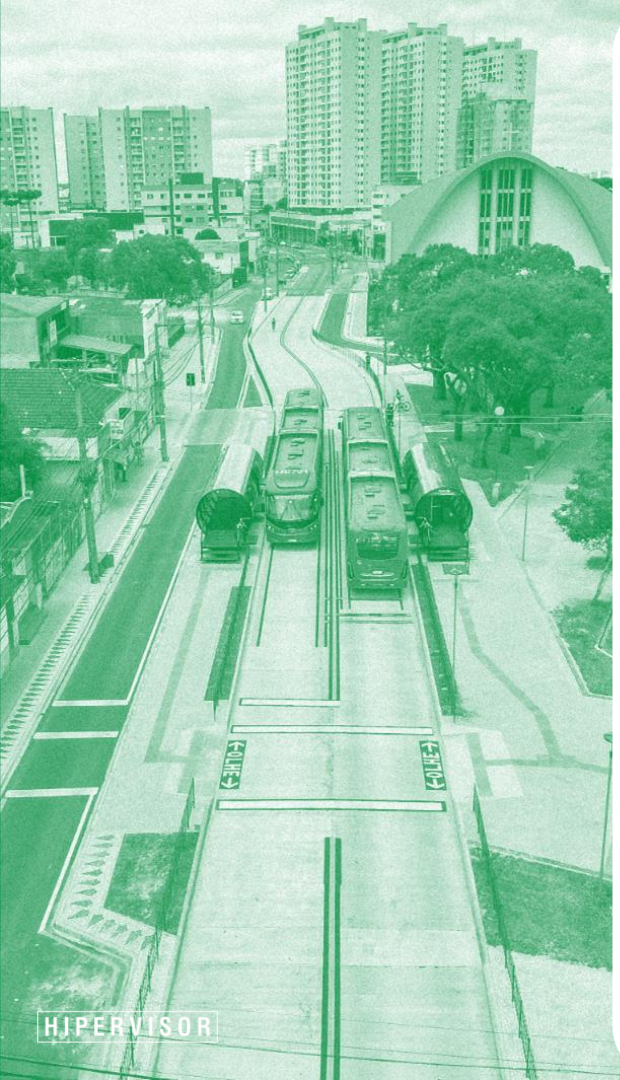
Institute for Research and Urban Planning of Curitiba | IPPUC

The Institute for Research and Urban Planning of Curitiba (IPPUC) was created in **1965.**

Its objective is to promote **sustainable development**, **integrating urban planning**, **mobility**, **the environment,** and **social well-being**.

IPPUC develops plans such as the **Master Plan**, which defines guidelines for land use, transportation, infrastructure, and residences in the city.

IPPUC



Innovations and Projects of IPPUC

Integrated Transportation System

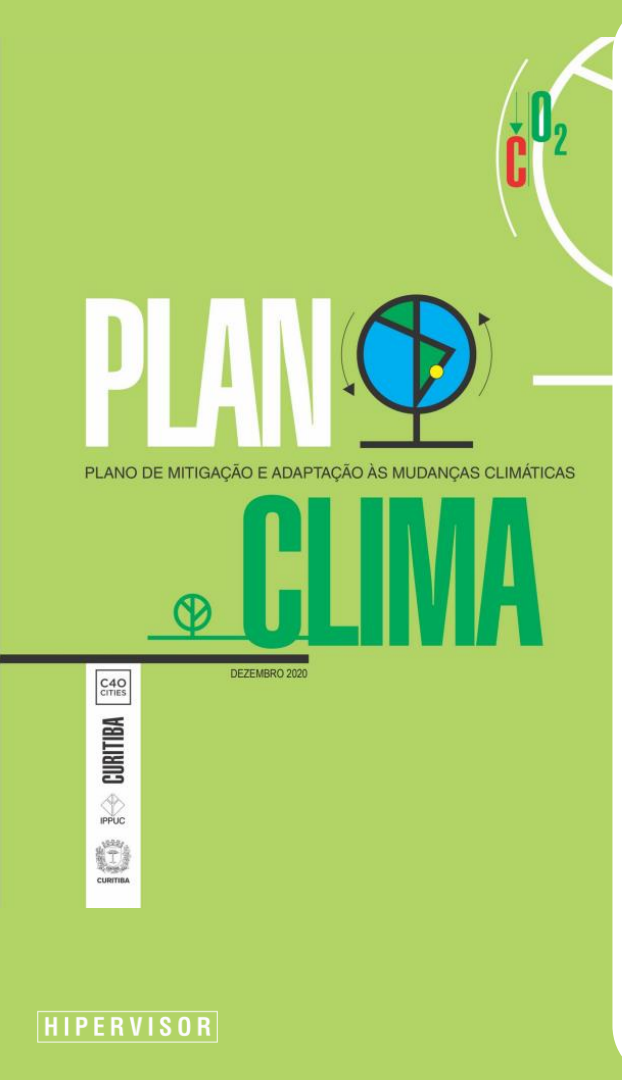
IPPUC was a pioneer in the creation of the **BRT (Bus Rapid Transit),** a transportation system that made Curitiba a global reference in sustainable urban mobility.

Sustainable Development

The institute promotes a balance between economic growth and environmental preservation, with projects focused on creating **urban parks**, green areas, and resilient infrastructure.

Innovative Urbanism

A pioneer in the **urban zoning** of Curitiba, integrating residential, commercial, and industrial areas harmoniously, ensuring quality of life and environmental preservation.



Sustainable Development and the Creation of PlanClima

Sustainable Vision
IPPUC's approach to sustainable development led to the creation of PlanClima, a strategic plan to mitigate and adapt Curitiba to climate change.

Shared Coordination
PlanClima is jointly coordinated by **IPPUC** and the **Municipal Secretariat of the Environment (SMMA)**, integrating urban planning and sustainability policies.

PlanClima's Goal
To make Curitiba **a carbon-neutral city by 2050**, increasing urban resilience to climate risks and promoting the sustainable use of natural resources, such as renewable energy and sustainable mobility.

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Alignment of PlanClima with International Agreements

Sustainable Development Goals (SDGs)

PlanClima is aligned with SDG 13 (Climate Action) and other goals from the United Nations 2030 Agenda, such as clean energy and sustainable cities.

Paris Agreement

Curitiba follows the commitments of the Paris Agreement, aiming to limit the global temperature increase to 1.5°C.

C40 Cities

The city is part of the C40 Cities, which brings together major global cities committed to climate action, receiving technical support to plan and implement climate actions according to international best practices.

Priority Actions of PlanClima

PlanClima identifies **20 priority actions** for Curitiba, distributed across **5 Strategic Sectors**:

ENVIRONMENTAL AND URBAN QUALITY
Maintenance of ecosystem services and promotion of environmental services in urban areas, equitably distributing the inclusive wealth of the city.

ENERGY EFFICIENCY
Incentive to renewable energy and building efficiency.

SOLID WASTE AND WASTEWATER
Management of solid waste and wastewater, encouraging production and conscious consumption, continuous improvement in the collection, treatment and final disposal of generated waste.

SUSTAINABLE URBAN MOBILITY
Promotion of urban mobility services in Curitiba with greater attractiveness to public transit, energy efficiency, and reduced circulation of individual vehicles.

URBAN HYPERVISOR AND INNOVATION
Establishing a data-driven culture to manage services in real time, planning long-term policies and encouraging innovation.

PlanClima Implementation

CURITIBA MORE ENERGY PROGRAM

- Caximba Solar Pyramid
- 29 de Março Palace
- Botanical Garden's Four Seasons Gallery
- Hydroelectric Power Station Nicolau Kluppel – Barigui Park

SUSTAINABLE URBAN MOBILITY PROGRAM

- Better Walking and Cycling Plan
- Inter 2 and East-West BRT
- Electrification of the bus fleet
- Structuring the new Transit System Concession

PlanClima Implementation

SUSTAINABLE URBAN MOBILITY PROGRAM ENVIRONMENTAL PRESERVATION AND SOLID WASTE

- 100 Thousand Trees
- Honey Gardens
- Community composting
- Disposal of waste to cement plants to be used as RDF (refuse-derived fuel)

ADAPTATION AND RESILIENCE

- Water Reserve of the Future
- Environmental Education “Leaves Family”
- Climate Risk Management Bairro Novo do Caximba
- Urban Farm and Community Urban Agriculture Crops
- Curitiba against Floods
- Disaster Prevention Alert and Alarm System – SisAAPrev

Creation of an Urban Hypervisor

Action 19 of PlanClima
The **Hipervisor Curitiba** is part of Action 19 of PlanClima, which aims to develop a real-time monitoring platform for climate management. Currently, the Hipervisor is in the implementation phase.

Strategic Sector and Climate Transparency
Support technological innovation and real-time data collection, promoting transparency in the execution of climate and urban actions.

Climate Monitoring and Resilience
The platform will be essential for monitoring climate risks, such as floods and heatwaves, enabling quick and effective responses while increasing urban resilience.

Creation of an Urban Hypervisor

The **strategic sector Urban Hypervisor and Innovation** aims to establish a **data-driven culture**.

It’s possible to:

— Assess the policies’ effects

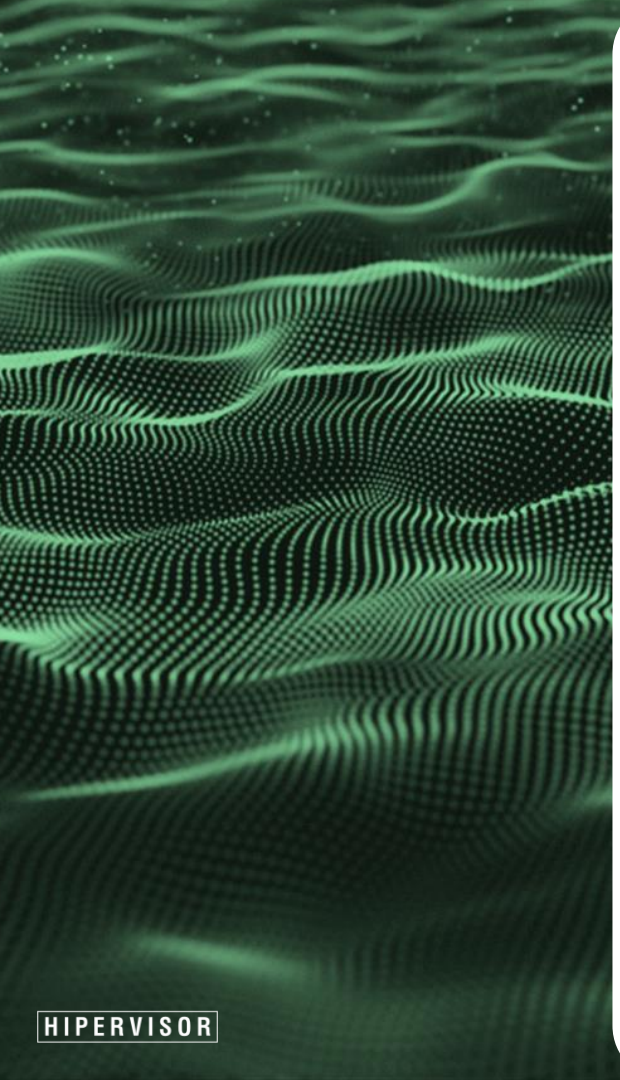
— Identify patterns within the city or in a community

— Perform the integration of the information and make it available to the involved actors

— Facilitate the urban planning and measurement of the climate mitigation and adaptation actions

Creation of an Urban Hypervisor

- → **Action 14**: Intensify monitoring of diseases and vectors related to climate change.
- → **Action 15**: Promote actions to control and monitor land use and occupation.
- → **Action 16**: Improve the alert system, monitoring, and response to extreme weather events.
- → **Action 17**: Develop circular economy strategies within the municipality.
- → **Action 18**: Promote environmental education campaigns and behavioral change.
- → **Action 19**: Develop and implement the Urban Hypervisor and Data Science unit.
- → **Action 20:** Establish governance structures for the implementation and management of PlanClima.



Technologies Integrated into Hipervisor Curitiba - Municipal Data Lake

The **Hipervisor Curitiba** has started using a **Municipal Data Lake** tool to manage the storage of data from various sources, whether structured or unstructured.

Centralized Storage

Big Data Analysis

Development of Artificial Intelligence

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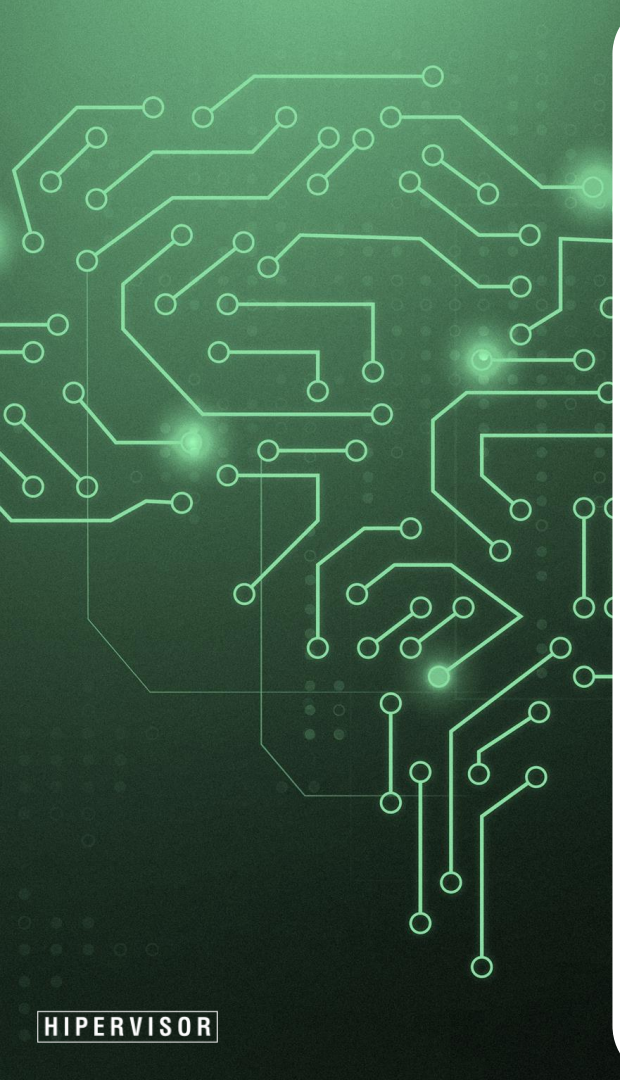


Technologies Integrated into Hipervisor Curitiba - Artificial Intelligence

Using **Artificial Intelligence (AI)** to process and interpret large volumes of city data enables predictive analysis to improve data management, helping to anticipate critical events and continuously monitor the city.

Faster Decision-Making

Automation of Processes

Generation of Insights

Technologies Integrated into Hipervisor Curitiba - Georeferencing

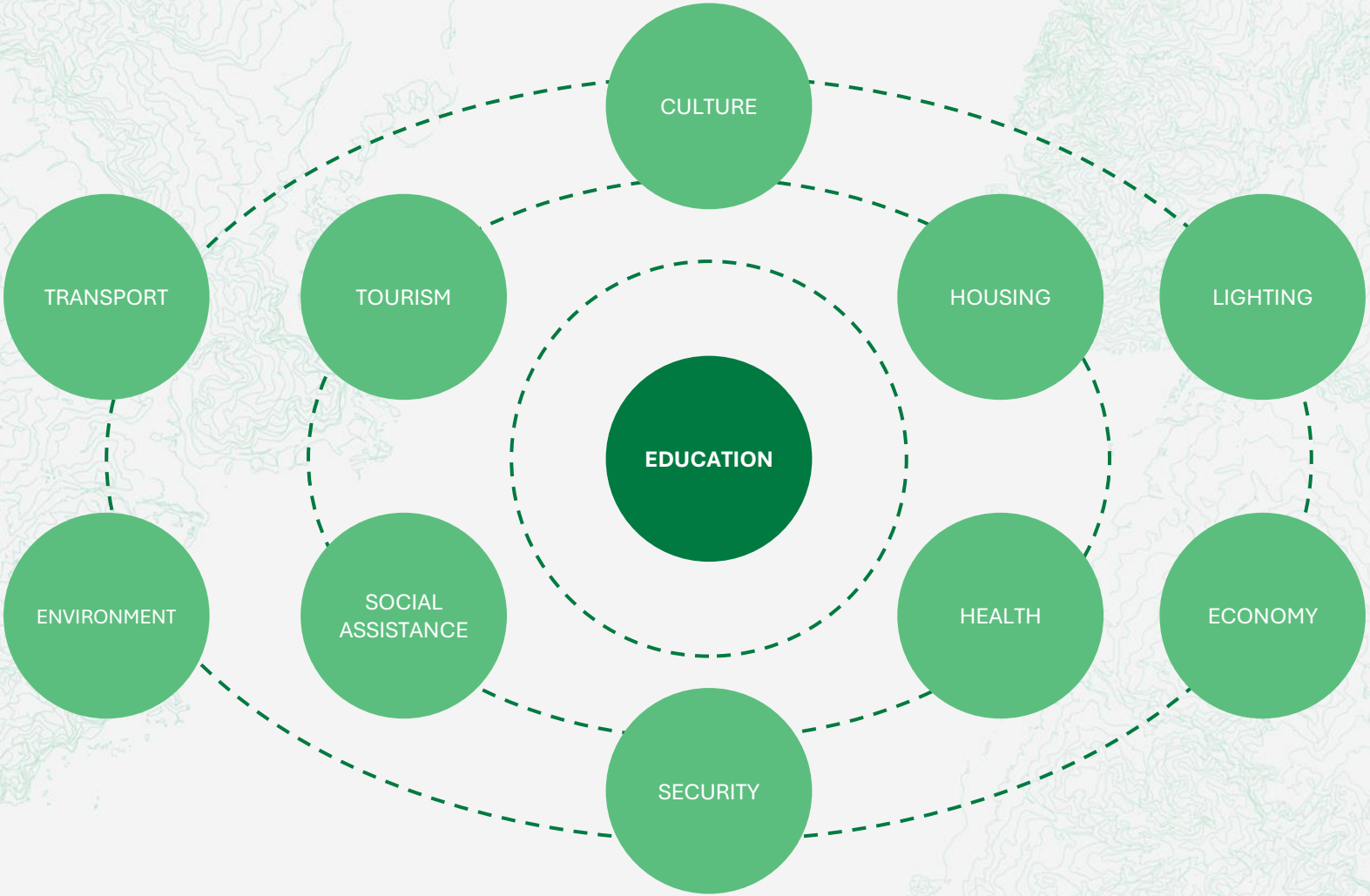
Curitiba has a strong georeferencing culture that has been established for many years, utilizing spatial data for urban planning and management. The city already uses the **GeoCuritiba** platform.

High-Precision Georeferenced Data

Based on ESRI Technology

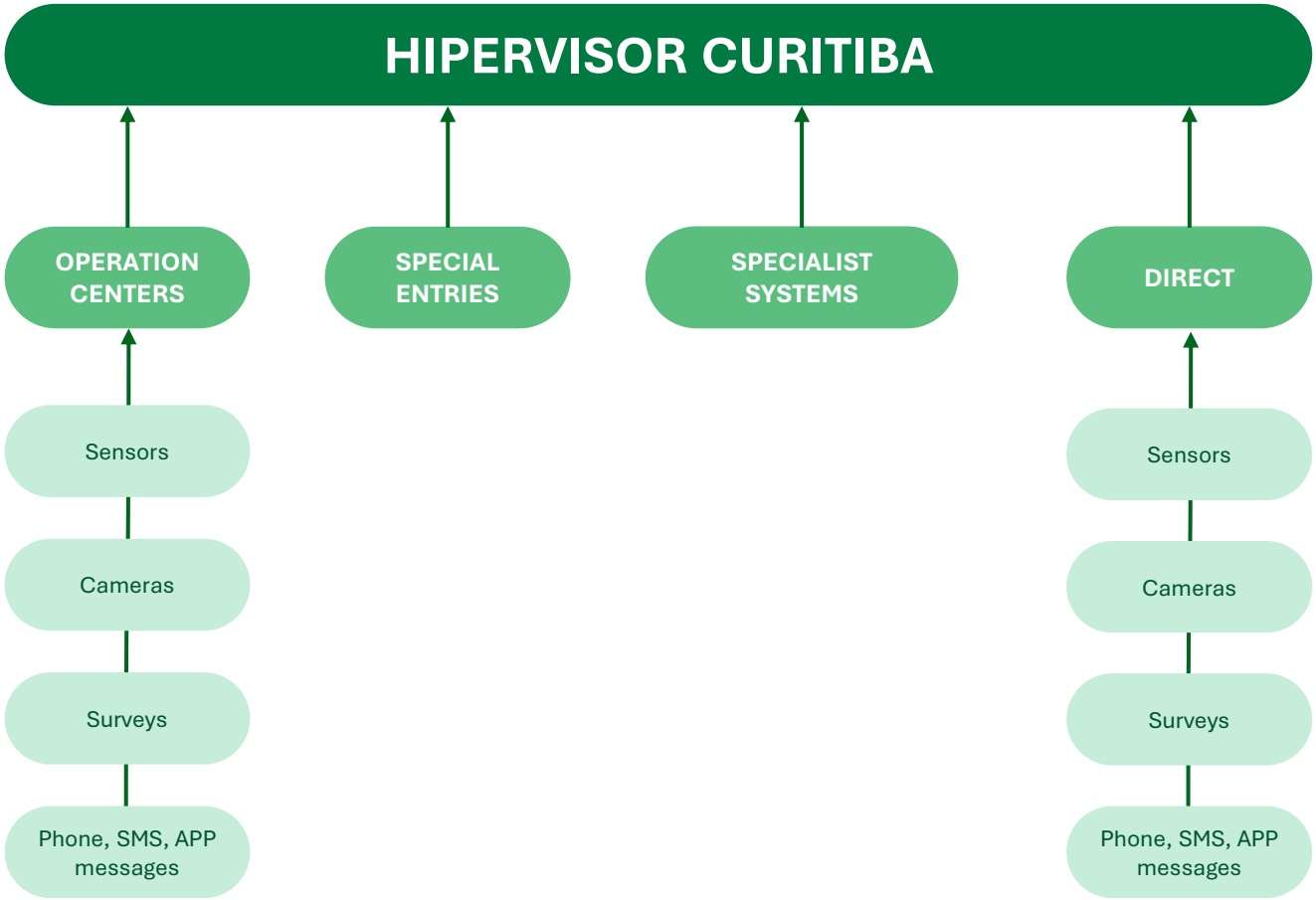
3D Modeling of Land and Buildings

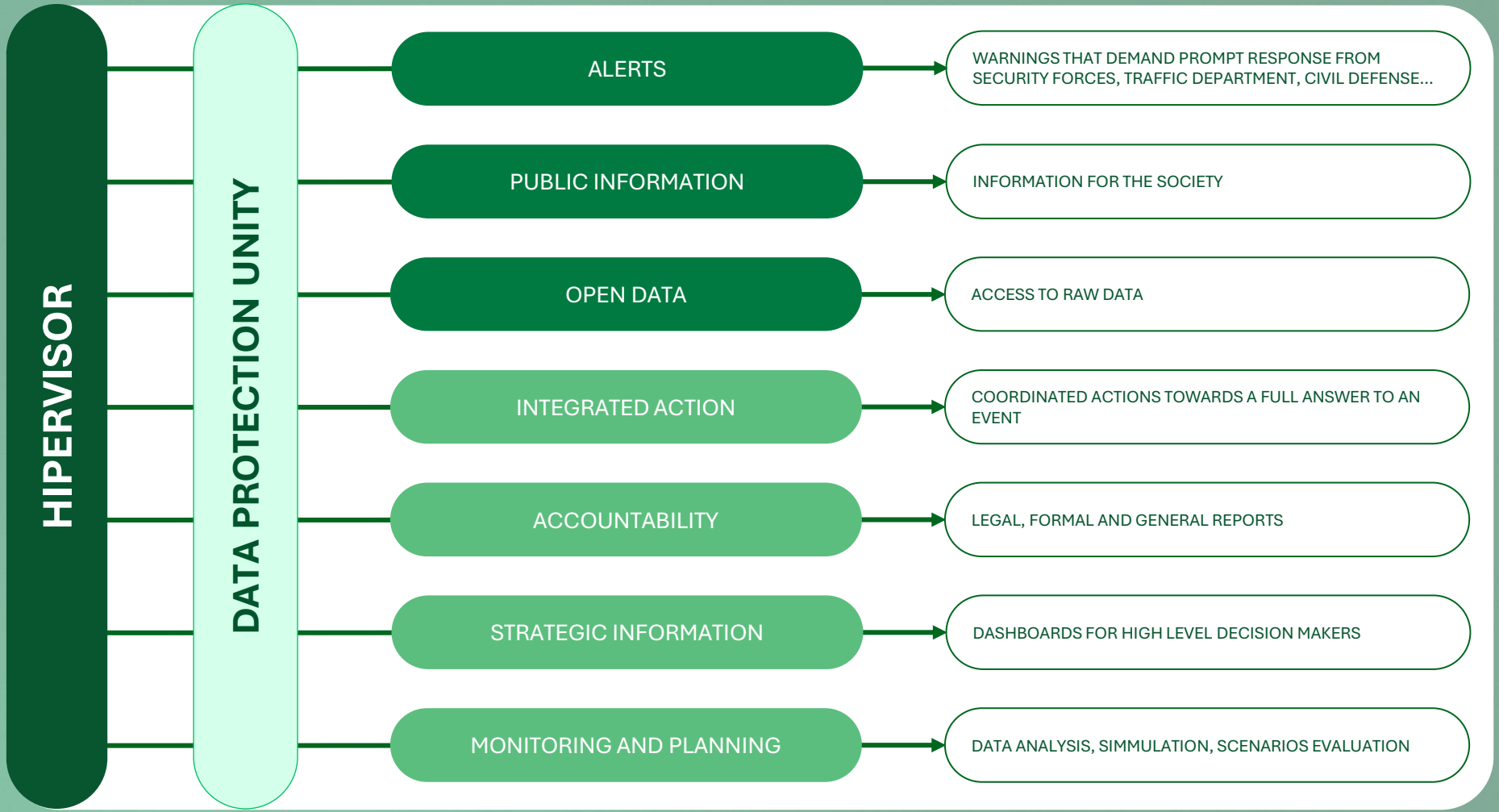
MULTI DOMAIN ANALYSIS



PROGRESSIVE ANALYSIS
DESCRIPTIVE ANALYSIS
DIAGNOSTIC ANALYSIS
PREDICTIVE ANALYSIS
PRESCRIPTIVE ANALYSIS

DATA PROTECTION UNITY

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DATA PROTECTION UNITY
ALERTS
WARNINGS THAT DEMAND PROMPT RESPONSE FROM SECURITY FORCES, TRAFFIC DEPARTMENT, CIVIL DEFENSE...
PUBLIC INFORMATION
INFORMATION FOR THE SOCIETY
OPEN DATA
ACCESS TO RAW DATA
INTEGRATED ACTION
COORDINATED ACTIONS TOWARDS A FULL ANSWER TO AN EVENT
ACCOUNTABILITY
LEGAL, FORMAL AND GENERAL REPORTS
STRATEGIC INFORMATION
DASHBOARDS FOR HIGH LEVEL DECISION MAKERS
MONITORING AND PLANNING
DATA ANALYSIS, SIMMULATION, SCENARIOS EVALUATION

HIPERVISOR CURITIBA

Software

Photo: Daniel Castellano / SMCS

Data plataform and system integrator

Peopleware

Team specialized in data Science, information analysis and AI algorithms

Hardware

Monitoring and control center

GSA,GSI and the GIS User Community | Prefeitura Municipal de Curitiba | Maxar | PMC 2019

Implementation of a Digital Twin by Hipervisor Curitiba

The **Hipervisor Curitiba** is implementing a **Digital Twin** of the city, a virtual model that demonstrates Curitiba's physical and operational conditions in real-time. It is being built on the **GeoCuritiba** georeferencing platform.

- **Level 1**: 3D Digital Model
- **Level 2**: Real Time City Data Integration
- **Level 3**: Actions taken via the Digital Twin

Thank you!

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