

THE IMPORTANCE OF CITY INFORMATION MODELING (CIM) FOR CITIES' SUSTAINABILITY

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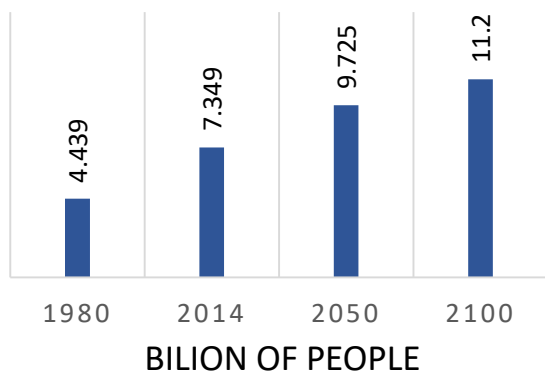
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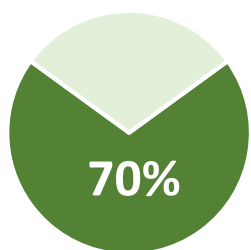
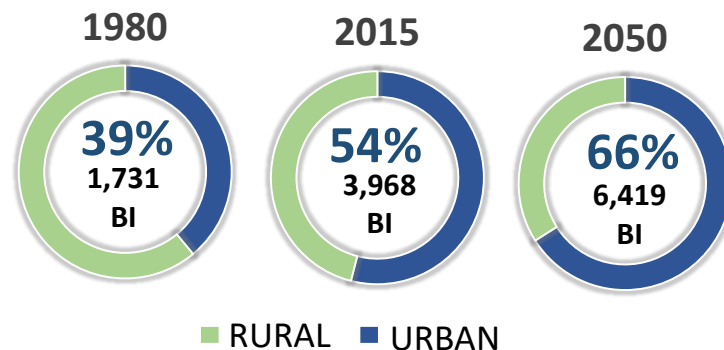
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CITIES' CHALLENGES

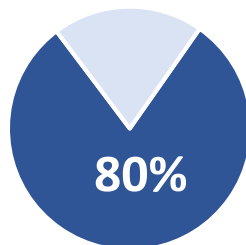
WORLD POPULATION



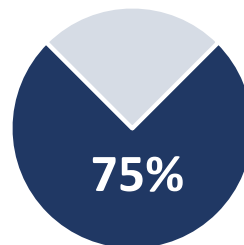
URBAN WORLD POPULATION (UN, 2014)



70% OF GDP



80% OF GREENHOUSE GASES EMISSIONS



75% OF ENERGY CONSUMPTION



3% OF PLANET'S SURFACE



SUSTAINABLE DEVELOPMENT

- REPORT OF THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (AGENDA 21, 1987):

“SUSTAINABLE DEVELOPMENT MEETS THE NEEDS OF THE PRESENT WITHOUT COMPROMISING THE ABILITY OF FUTURE GENERATIONS TO MEET THEIR OWN NEEDS.”



FIGURE 1: SUSTAINABLE DEVELOPMENT GOALS (UN, 2015).

ISO 37120



SUSTAINABLE



RESILIENT



PUBLIC
POLICY
PLAN



URBAN
ENVIRONMENT



INDICATORS

CURRENT
RESOURCE
CONSUMPTION



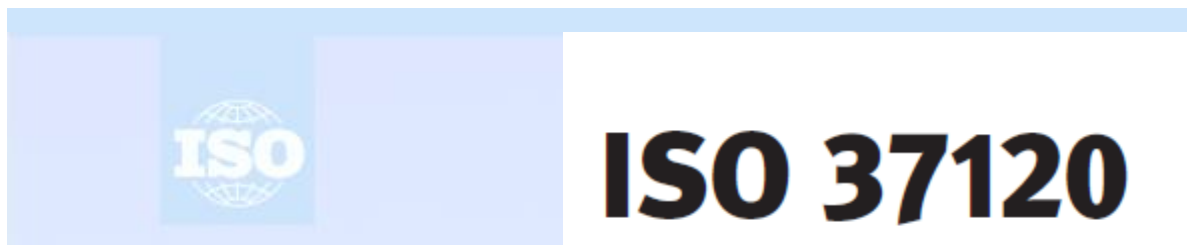
ISO 37120

Sustainable development of communities

Indicators for city services
and quality of life



ISO 37120



ISO 37120 – INDICATORS FOR CITY SERVICES AND QUALITY OF LIFE

ISO 37120 includes **100** indicators (46 core and 54 supporting), which are structured around the following **17** themes:



FIGURE 2: THEMES OF ISO 37120 (WCCD, 2019).


INDICATORS


 **CORE**

 **SUPPORTING**

 STANDARDIZED INDICATORS

 NO RANKING

 UNIFORM APPROACH TO WHAT IS MEASURED

 HOW IT SHOULD BE MEASURED



BENEFITS OF GLOBALLY STANDARDIZED INDICATORS FOR CITIES

STANDARDIZED INDICATORS ENABLE CITIES TO **ASSESS THEIR PERFORMANCE, MEASURE PROGRESS** OVER TIME, AND ALSO TO DRAW COMPARATIVE LESSONS FROM OTHER CITIES LOCALLY AND GLOBALLY (WCCD, 2019).

MANAGE AND MAKE INFORMED DECISIONS THROUGH DATA ANALYSIS

BENCHMARKING AND TARGET

PLAN AND ESTABLISH NEW FRAMEWORK FOR SUSTAINABLE URBAN DEVELOPMENT

EVALUATE THE IMPACT OF INFRASTRUCTURE PROJECT ON THE OVERALL PERFORMANCE OF A CITY (CIM)



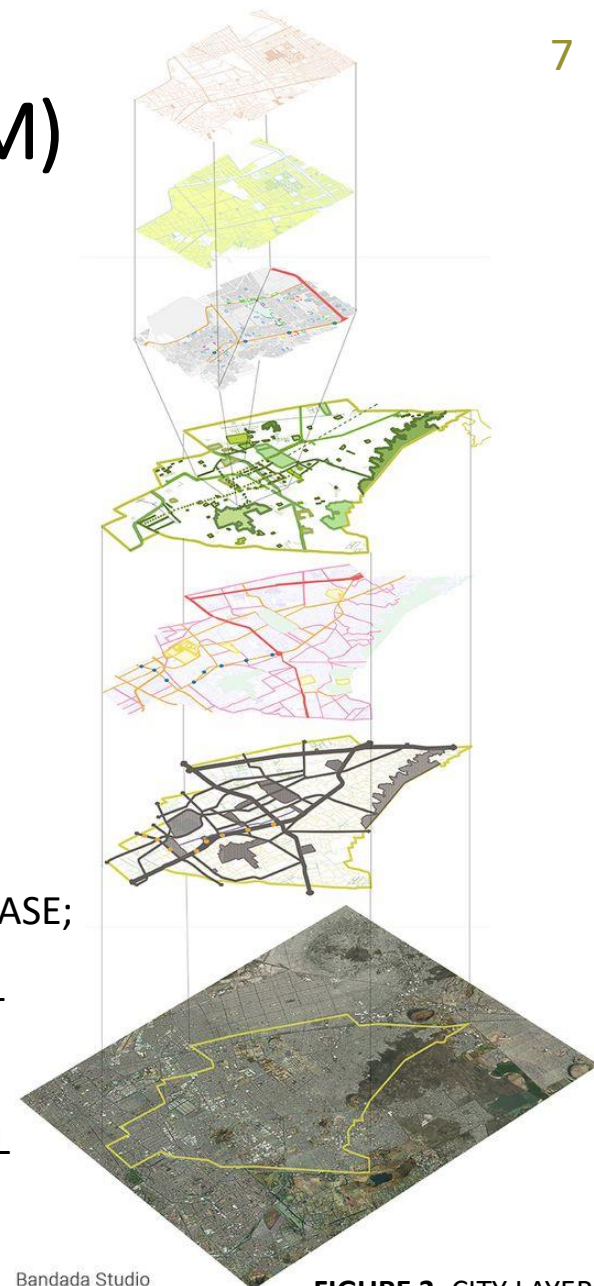
CITY INFORMATION MODELING (CIM)

CIM
URBAN
ENVIRONMENT

- ➔ VISUALIZING
- ➔ ANALYZING
- ➔ MONITORING

BIM  **GIS**

- ➔ COORDINATE WORK OCCURS IN A SINGLE AND SHARED DATABASE;
- ➔ SUPPORT PROJECT AND PLANNING FROM LOCAL TO REGIONAL OVERVIEW;
- ➔ CHARACTERIZED BY A MULTIDISCIPLINARY UNIFICATION OF ALL SPATIAL DATA MODEL.



Bandada Studio

FIGURE 3: CITY LAYERS.

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METHODOLOGY



LITERATURE REVIEW

SUSTAINABILITY

URBAN PLANNING

BUILDING
INFORMATION
MODELING (BIM)

GEOGRAPHIC
INFORMATION SYSTEMS
(GIS)

CITY INFORMATION
MODELING (CIM)



IN-DEPTH STUDY

ISO 37120

SUSTAINABLE
DEVELOPMENT OF
COMMUNITIES –
INDICATORS FOR CITY
SERVICES AND QUALITY
OF LIFE



IDENTIFY ISO INDICATORS

• AIMED TO DETECT THE
INDICATORS THAT CAN
BE APPRISED BASED ON
DATA PROVIDED BY **BIM**
OF EDIFICATIONS AND
BY A **CIM** MODEL OF
CITY



RESULTS AND DISCUSSIONS

THEME	INDICATORS		INDICATORS BY DATA ORIGIN		
	CORE	SUPPORTING	BIM	CIM	OTHER
ECONOMY	3	4	0	0	7
EDUCATION	4	3	0	0	7
ENERGY	4	3	1	6	0
ENVIRONMENT	3	5	0	7	1
FINANCE	1	3	0	0	4
FIRE AND EMERGENCY RESPONSE	3	3	0	2	4
GOVERNANCE	2	4	0	0	6
HEALTH	4	3	0	0	6
RECREATION	0	2	0	2	0
SAFETY	2	3	0	4	1
SHELTER	1	2	0	0	3
SOLID WASTE	3	7	3	7	0
TELECOMMUNICATION AND INNOVATION	2	1	0	2	1
TRANSPORTATION	4	5	0	4	5
URBAN PLANNING	1	3	0	3	1
WASTEWATER	5	0	0	5	0
WATER AND SANITATION	4	3	5	2	0
TOTAL	46	54	9	44	47

TABLE 1: NUMBER OF ISO 37120 INDICATORS BY THEME.

RESULTS AND DISCUSSIONS

SOLID WASTE

EVALUATES (ISO, 2014):

- POPULATION ATTENDENCE BY REGULAR COLLECTION
- SOLID WASTE FINAL DESTINATION
- PRODUCTION AND RECYCLING OF HAZARDOUS WASTE



IMPACT (ISO, 2014):

- PUBLIC HEALTH
- LOCAL ECONOMY
- ENVIRONMENT

2 INDICATORS FROM BIM (PRODUCTION)

7 INDICATORS FORM CIM (FINAL DESTINATION)



FIGURE 4: SOLID WASTE ILLUSTRATION.

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RESULTS AND DISCUSSIONS

WATER AND SANITATION

EVALUATES (ISO, 2014):

- POTABLE WATER ACCESS
- WATER CONSUMPTION, INTERRUPTIONS AND LOSSES IN SUPPLY

INPACT (ISO, 2014):

- QUALITY OF LIFE
- LOCAL DEVELOPMENT

5 INDICATORS FROM BIM (ACCESS AND CONSUMPTION)

2 INDICATORS FORM CIM (INTERRUPTIONS AND LOSSES)

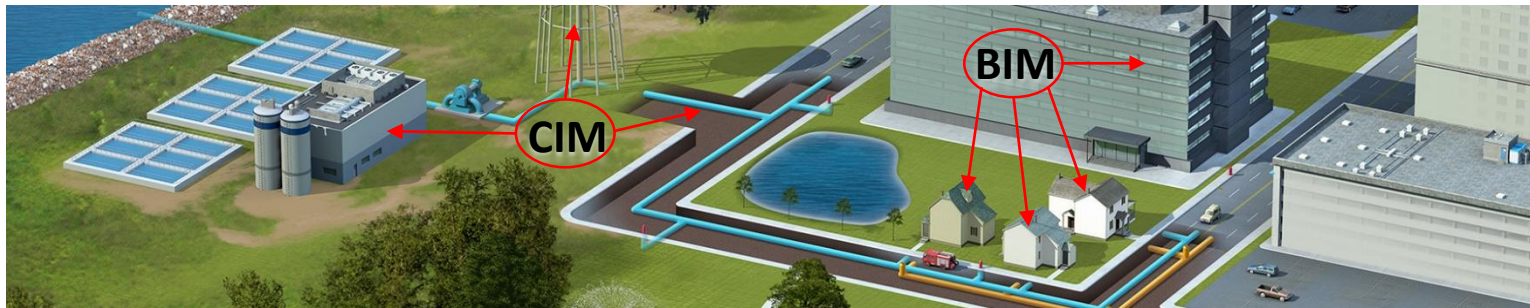


FIGURE 5: WATER NETWORK ILLUSTRATION.
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CONCLUSIONS

- CITY INFORMATION MODELING (CIM) IS ESSENTIAL FOR THE IMPLEMENTATION OF SUSTAINABILITY CONCEPTS IN CITIES;
- THE BIM AND CIM MODELS SHALL ENABLE THE OBSERVATION OF CITIES' DEVELOPMENT IN REAL TIME;
- POSSIBILITY OF AUTOMATIZATION OF 53 OF THE 100 INDICATORS OF THE INTERNATIONAL ISO 37120 STANDARD;



CONCLUSIONS

- THE MANAGEMENT OF URBAN INFRASTRUCTURE IN ACCURATE AND GEOREFERENCED DATA SHALL RESULT IN MORE ASSERTIVE ACTIONS FOR THE IMPROVEMENT OF THE URBAN INFRASTRUCTURE SUBSYSTEMS;
- REDUCE THE NEED OF CORRECTIVE MAINTENANCE BRINGING FORTH RESOURCE SAVINGS;
- IMPROVEMENT IN THE PROVISION OF PUBLIC SERVICES FOR THE POPULATION.



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THANK YOU!
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