

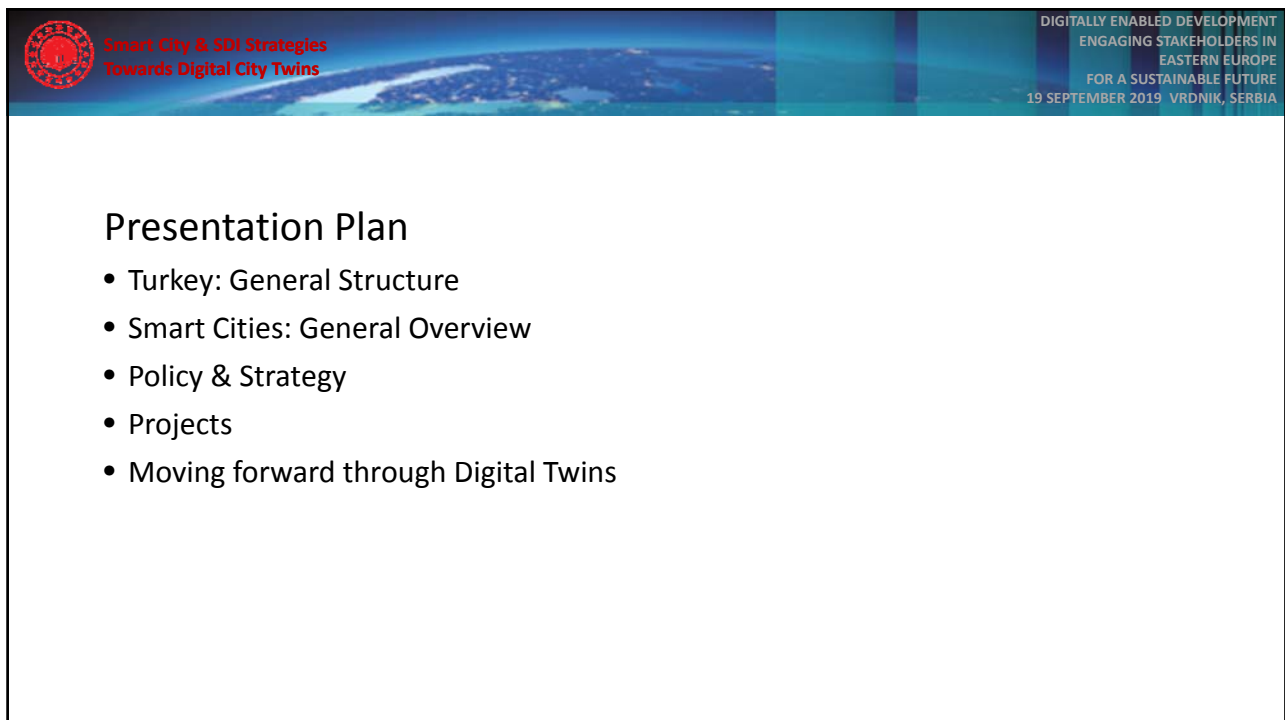



 **Smart City & SDI Strategies
Towards Digital City Twins**

**DIGITALLY ENABLED DEVELOPMENT
ENGAGING STAKEHOLDERS IN EASTERN EUROPE
FOR A SUSTAINABLE FUTURE**

Dursun Yıldırım Bayar
Republic of Turkey, Ministry of Environment and Urbanisation
Directorate General of Geographical Information Systems

18-20 SEPTEMBER 2019
VRDNIK, SERBIA



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Presentation Plan

- Turkey: General Structure
- Smart Cities: General Overview
- Policy & Strategy
- Projects
- Moving forward through Digital Twins




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Digital User Statistics: Turkey / World

	Total Population	Mobile Subscription	Internet Users	Active Social Media Users	Mobile Social Media Users
TURKEY	82.44 Million Urban Pop.: 75%	76.34 Million Pop. Ratio: 93%	59.36 Million Pop. Ratio: 72%	52.00 Million Pop. Ratio: 63%	44.00 Million Pop. Ratio: 53%
WORLD	7.59 Billion Urban Pop.: 55%	5.14 Million Pop. Ratio: 68%	4.02 Billion Pop. Ratio: 53%	3.20 Million Pop. Ratio: 42%	2.96 Million Pop. Ratio: 39%

Source: Hootsuite Report, January 2019



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Administrative Structure

	Ministries	Provinces	Municipalities	Metropolitan Municipalities
TURKEY	16	81	1387	30



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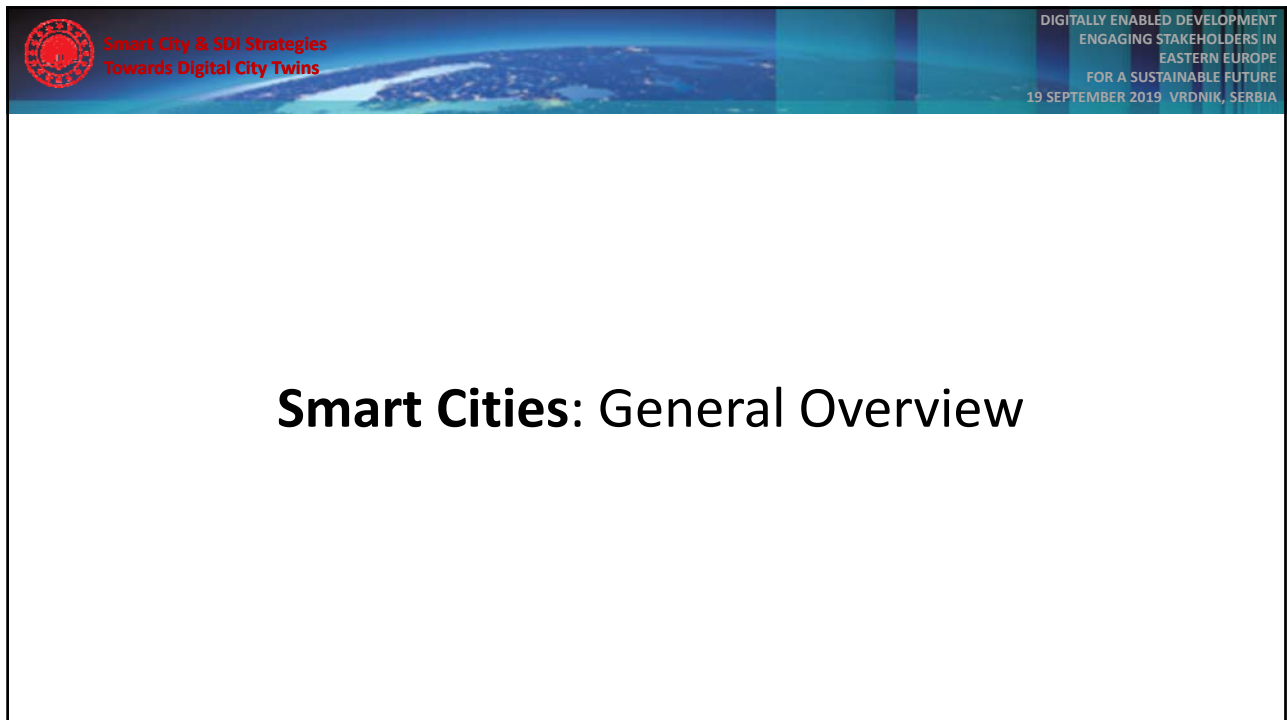
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Digitalisation is the driver of sustained growth

Under the coordination of Presidency;

- Systems of institutions are being integrated;
 - Within the digital transformation, “diploma, criminal record documents, land registration document, identity registration etc. Documents» our Ministry made protocols with 19 responsible institutions.
 - Application for 188 services (MoEU) are made through e-Government.

«In Turkey, digital university registration saved over 43 Million Euro in 2019 (504.000 Students)»



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Smart Cities: General Overview



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U.S.A. Netherlands Turkey Australia

Fourth smart cities strategy and action plan in the world

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North American Approach: Sustainability & Technology

European Approach: Sustainability & Technology

Asia - Pacific Approach: Technology

Technology would not be independent from sustainability in smart cities

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The solutions that will form our future, should be different than today.

SMART CITY				
Sustainable City	Connected City	Resilient City	Participatory City	Transparent City
Joint City	Green City	Attractive City	Adaptive City	City Identity
Comprehensive City	Secure City	Academic City	Productive City	Digital City

Beyond digitalisation, smart cities bring together many approaches; including geospatial data, technology management and socio-economical factors.

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2020-2023 National Smart Cities Strategy and Action Plan includes 16 components.

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Sensors – Data Collectors – Data Producers

Communication Infrastructure
Wide Band– 5G
Fiber Optic Infrastructure

Data / Communication Protocols

Image Processing
Big Data
Artificial Intelligence
Machine Learning
Augmented Reality

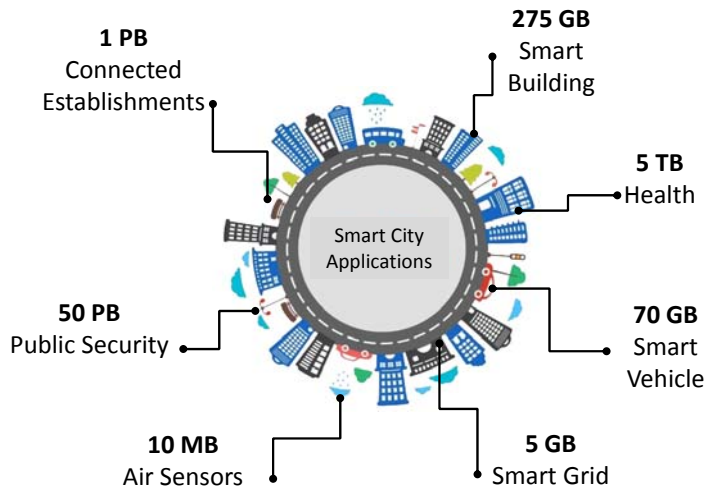
Applications

Spatial Data Infrastructure



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By 2020, a city of 1 million population will produce daily 200 million GB data.

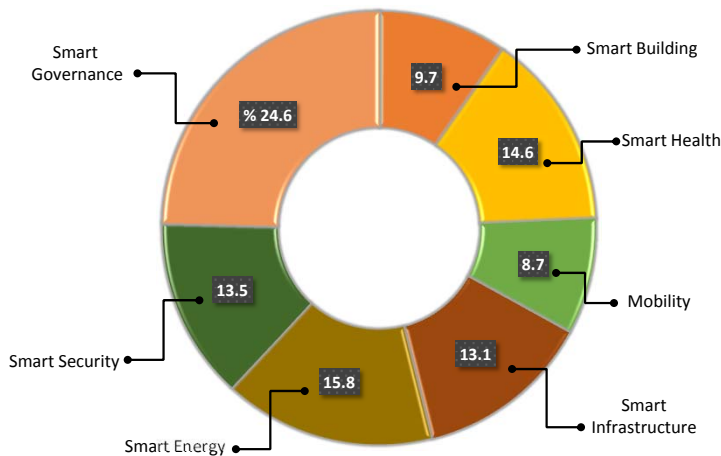
Source: Cisco Global Cloud Index, 2015-2020
Calculated by Daily values.



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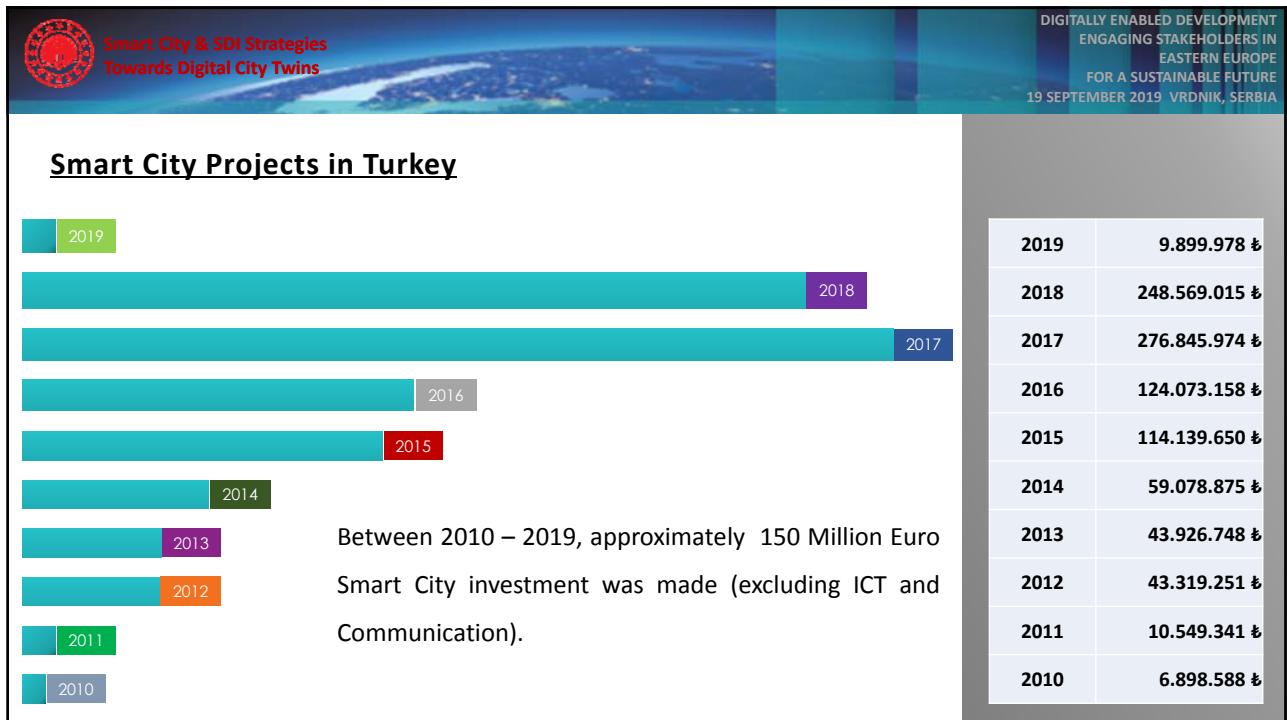
Component Based Global Smart City Market Analysis (2012-2020)



By 2020, smart cities market value is foreseen to reach 2.2 Trillion USD.

GIS industry share is foreseen as 439 Billion USD.

(Frost & Sullivan, 2018)



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Cloud Urban Information System

bep TR
bina enerji performansi

Zero Waste

SIFIR ATIK

e-plan

Bizimşehir

Bicycle Roads

Urban Gardens

3B Kadastro

Geographic Data Service Pool

3D Data

Smart Building Concept

Environment & Urbanisation Software Systems

E-Government Integrations

Smart cities are human centric in which space and digitalisation forms a joint structure.



Smart Cities: Policy & Strategy



11th Development Plan of Turkey: Smart Cities

Main Policies:

- Local smart city strategies and prioritising projects,
- Maturity assessment and guidance of local governments,
- National production in smart city applications,
- Developing smart city ecosystem

«With the National Smart Cities Strategy and Action Plan prepared in Turkey, local authorities are given direction to the target of becoming a smart city.»


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2020-2023 National Smart Cities Strategy and Action Plan

Project Outputs

- Current situation analysis and determining necessities
- Strategy and Action Plan
- Maturity assessment model
- Monitoring and evaluation system
- Smart city information sharing portal
www.akillisehirler.gov.tr



«Livable and Sustainable Cities that Add Value to Life»

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2020-2023 National Smart Cities Strategy and Action Plan Project Phases




Completed Process | Planned Process



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According to 2019-2022 National Smart Cities Strategy and Action Plan Definition of Smart City:

Livable and sustainable cities that are put into practice in cooperation with partners;

- using new technologies and innovative approaches,
- justified by data and expertise
- also offering solutions that enrich the life by foreseeing future problems and needs



Main Aspects of National Strategy and Action Plan

2020-2023 National Smart Cities Strategy and Action Plan specifies 4 Strategic Aims, 9 Targets ve 40 Actions.

- Smart city counseling guidance will be prepared.
- Smart city capacity development works will be carried out at national and local levels.
- Smart city maturity evaluation studies will be started.
- It will be guided to preparation of strategy and road map belongs to local dynamics.
- The common terminology of the smart city will be determined and dissemination studies will be carried out.
- 2019-2022 National Smart Cities Strategy and Action Plan introductory meetings will be held.
- Establishment of the smart city governance mechanism will be done.
- NSDI integration will be carried out by reference architecture works.



VISION: Livable and Sustainable Cities that Add Value to Life

STRATEGIC GOALS

1. Establishing a smart city ecosystem
2. Improving capability
3. Providing interoperability
4. Coordination





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1. Establishing an ecosystem



- Capacity building in priority determined areas
- Establishing a digital smart city ecosystem platform
- Improving human resources
- Disseminating smart city applications
- National development of products and applications



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2. Improving capability



- Technology inventory
- Establishing smart city market
- International, national and regional smart city experience sharing events
- Exporting successful smart solutions

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3. Providing interoperability,



- Reference architecture
- Terminology
- NSDI Integration
- Data Dictionary
- Disseminating urban information systems
- Open data center



ISO 37120:2014

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4. Coordination



- Guidance for local governments
- Maturity assessment, performance measurement
- Preparation of local strategies and road maps by municipalities
- Cooperation and coordination of stakeholders.
- Smart city coordination board




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National Spatial Data Strategy and Action Plan Strategic Goals



- Establishment of institutional NSDI structure
- Completing sharing of Spatial Data in the context of interoperability
- Institutional and individual capacity building
- Disseminating NSDI countrywide
- Establishing a globally competitive GIS industry




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Monitoring and Evaluation Model

The measurement method to be used within the scope of the Monitoring Evaluation Model will be the main tool that will enable the partners of the Smart Cities Ecosystem to monitor and evaluate the progress criteria of the Action Plan and the performance indicators of the actions, as well as the progress and achievements of the Action Plan.

Monitoring and Evaluation Process



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    A[Data entry by SEPIDS] --> B[Validation and Computation]
    B --> C((Periodic Monitoring and Evaluation))
    
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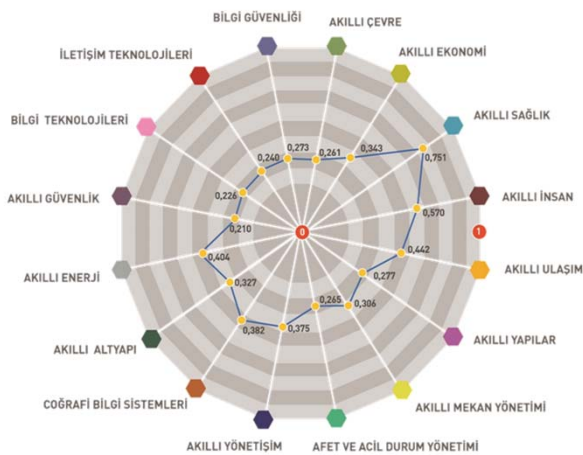


Maturity Assessment Model

Within the scope of the project, by the implementation of Smart City Maturity Assessment Model, it is aimed to determine the competencies of cities in Turkey related to smart city governance and implementations by conducting interviews with all partners.

Maturity evaluation pilot studies are carried out in Konya Selçuklu and İstanbul Beyoğlu Municipalities.

With realizing the same studies in all of our cities, the smart city index will be created by



"Smart People" Performance Results



Leading & Current Projects



Esenler Smart City (Istanbul) Urban Transformation Project

Total Number of Single Space : **64.334**

Total Population: **177.040**

Project Area: **8.428.465 m²**

Project covers;

- Local Smart City Strategy and Road Map
- National Garden (200 Ha)
- Smart city applications
- Technology Development Zone



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Smart Parking Application
It is planned to be established in Esenler with a cost of **1.4 Million Euro** and **4.5 years of RoI**

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Adaptive Intersection

By building 20 smart intersections in the Project area;

- Annually **2.25 Million L. oil saving**
- **Decreasing CO2 emissions over 1500 Tonnes annually**

Smart Waste Collection System

Smart waste collection saves 45% in the collection and transportation of wastes.

- eg. Cost in Istanbul is over 150 Million Euro by the conventional methods.
- It is planned to save 1 Million Euro annually, in the Project area.

Smart Street Lighting

With an investment of 4 Million Euro

- **36% Annual Saving**
- 1.3 MWh Energy Saving
- 4 Years of RoI
- **Decreasing 900 Tonnes of CO₂ emission annually.**

Constructing a smart building increases costs approximately 6%.
Return on Investment is 4 Years.

eg. Cost of applying **Building Information Management** In a 10.000 Apartment Project;
Cost Per Apartment: 150 Euro
Construction Add. Cost Ratio: % 0.34



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Cloud Urban Information System



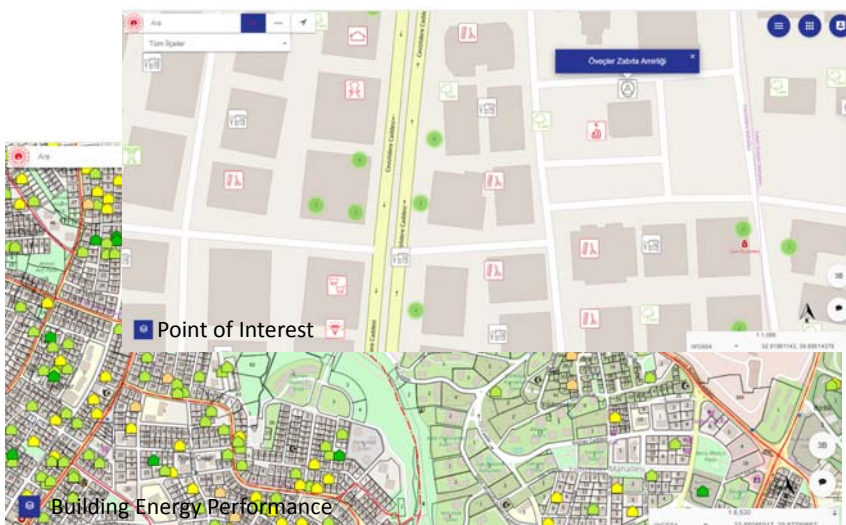
Cloud Urban Information System provides geospatial modules for the free use of municipalities.



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Cloud Urban Information System



- Local, standard spatial data production
- Decrease license costs
- Improving service quality of municipalities
- Data infrastructure for smart cities
- Over 25 geospatial modules

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Atlas Application
www.tucbs.atlas.gov.tr

TUCBS

Geoportal Application
www.geoportal.gov.tr

NSDI Integration Project:
Integration to national portal;
web services and metadata:

- 32 Institutions,
- 30 Metropolitan Municipalities

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3D Building and City Topography Project
(Ministry of Environment and Urbanisation – DG Geographical Information Systems)

- CityGML Data production of buildings in 77 provinces are completed (10cm. Res. True Orthophoto Project data is used, LoD2 applied)
- Data covers an urban area over 40.000 Km²
- 81 Provinces are planned be completed by the end of 2019.

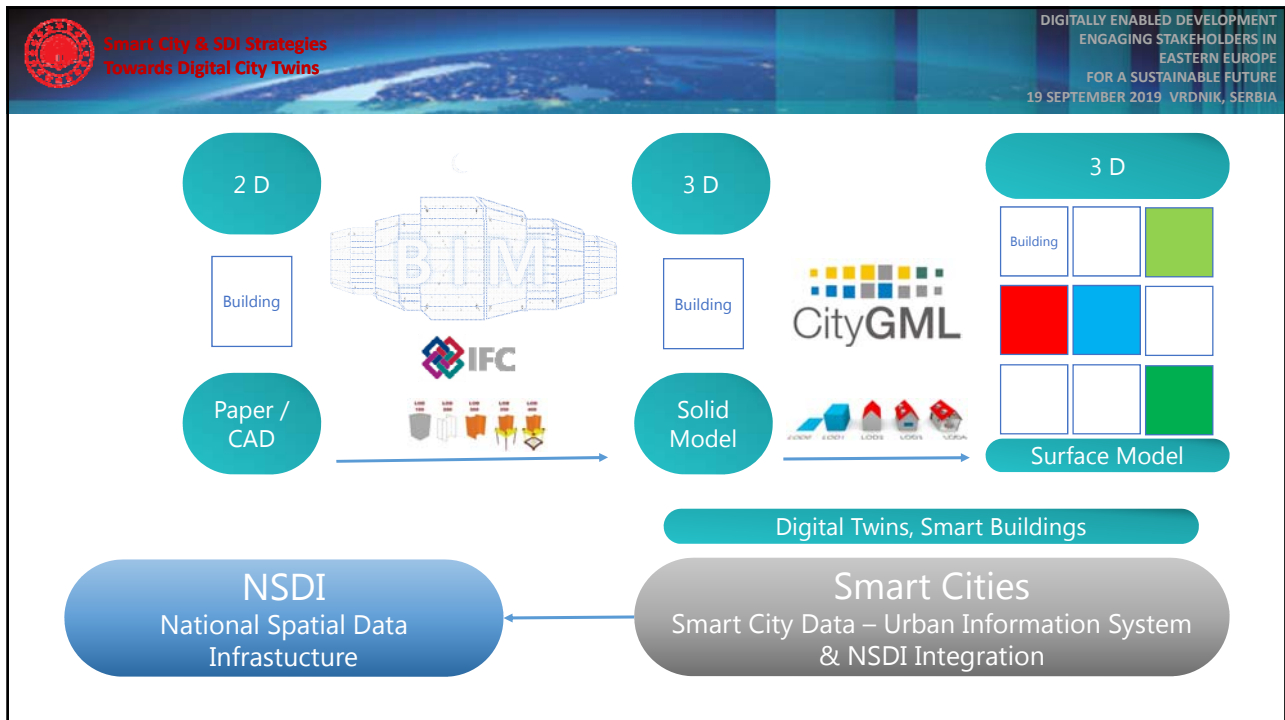


https://www.youtube.com/watch?v=kuaqx_5NJx0

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Moving forward through Digital Twins



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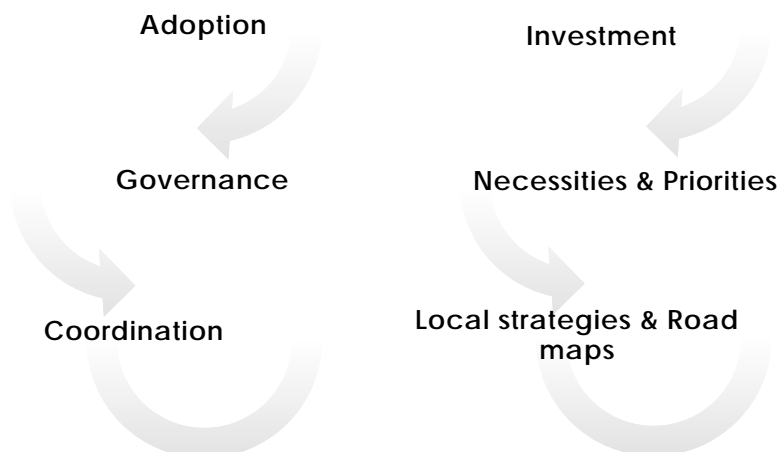
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Conclusions

- Enforcement of BIM for buildings at permitting stage and establishing a joint structure for geospatial 3D standards are necessary .
- Legislation is a must.
- Capacity building is important.
- Data needs to be up to date.
- Sharing Outputs of Successful Projects and Engaging Ecosystem Members are important tasks.



Challenges and Other Important Tasks



- *The Silo Mentality:
How To Break Down The Barriers:**
- a Unified Vision.
 - a Common Goal.
 - Motivate and Incentivize
 - Execute and Measure
 - Collaborate and Create.

*From an article by Brent Gleeson



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Thank You...

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Republic of Turkey, Ministry of Environment and Urbanisation
Directorate General of Geographical Information Systems
Smart Cities and Geospatial Technologies Department