

Public Policies and Applications of Geospatial Big Data in South Korea

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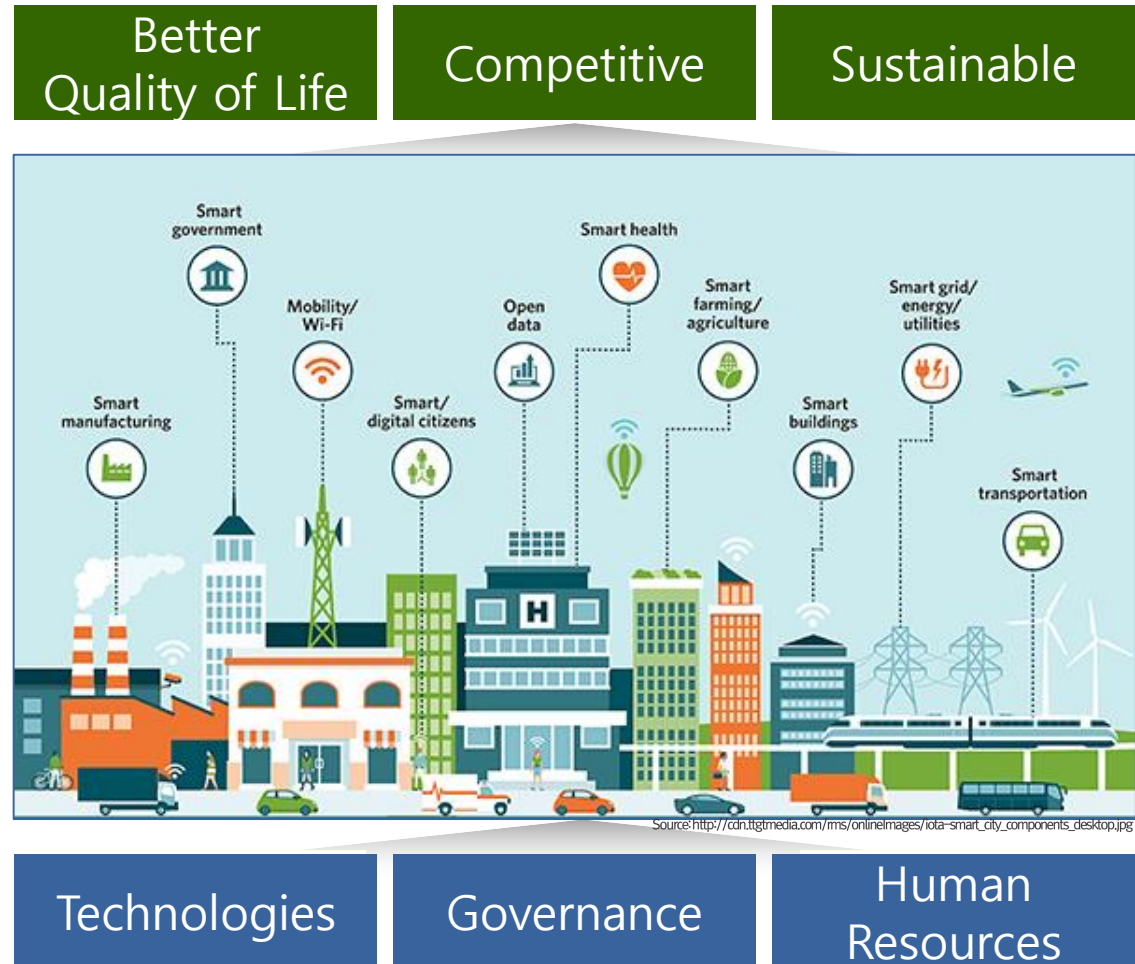
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1. Introduction
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Introduction

Vision of Smart City

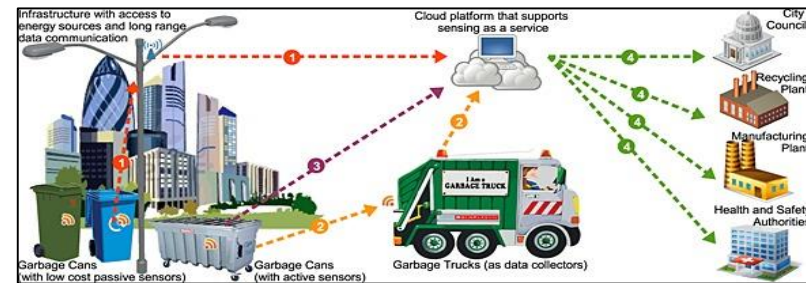
- Build Urban Spaces Embedded with ICT Convergence and Green Technologies In Order To Better Solve Urban Problems and Make Cities Function More Efficiently (Jaeyong Lee, 2016)
- Use Information Before Making Investments On Physical Infrastructure (Jaeyong Lee & Hosang Sakong, 2015)



Smart City and Location-based Big Data

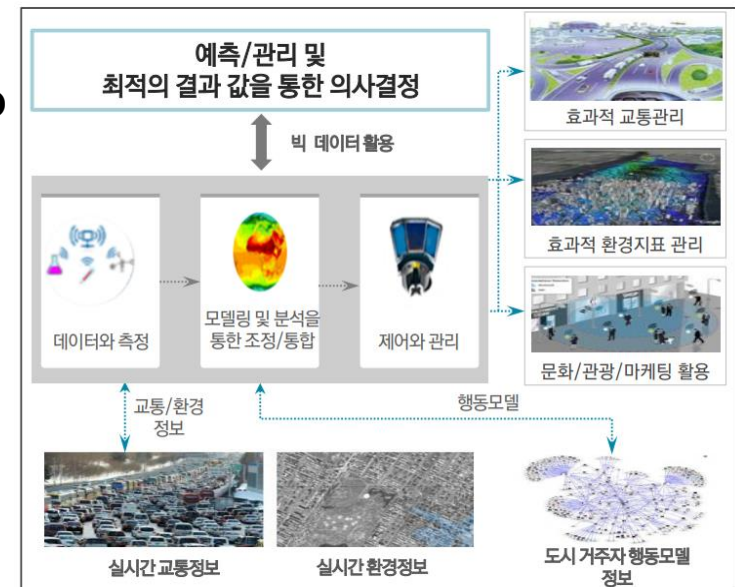
Smart City Produces Big Data, Often With Location and Timestamps

- Smart Sensors and IoT Infra Generate Big Data of Various City Environments and Human Behaviors, Including Data of Where and When



Source: https://www.researchgate.net/profile/Charith_Perera2/publication/253646221/figure/fig7/AS:267997428318229@1440906974504/figure-6-Efficient-waste-management-in-Smart-Cities-supported-by-the-sensing-as-a-png

- Such Data Provides Valuable information for Smart City, As Analyses of Them Lead to
 - Better and Often Detailed Understanding of Complex Urban Systems,
 - Design and Operation of Efficient Urban Services,
 - Improved Planning & Management of Cities



Source: http://www.k-smartcity.kr/data/open_smart_city_platform.pdf

Focus of Discussion

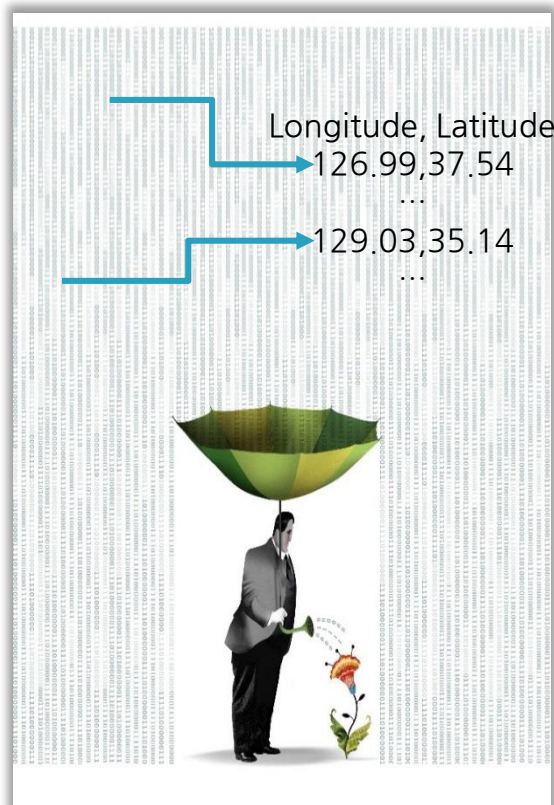
- Current Status of Public Applications of Location-based Big Data, aka Geospatial Big Data, in South Korea
 - Spatially Covering General Cities and Regions, Including Smart Cities
 - From A Viewpoint of Developing Smart Urban/Regional Policies
 - Ultimately, Try to Derive Implications for Better Smart City Services

- Overview of Concepts and Policies of Geospatial Big Data

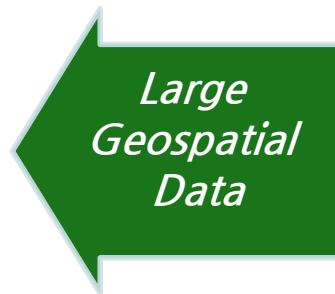
Concept and Nature of Geospatial Big Data

What is Geospatial Big Data?

- Big Data with Spatial or Temporal Attributes
- Collection of Microscopic Records



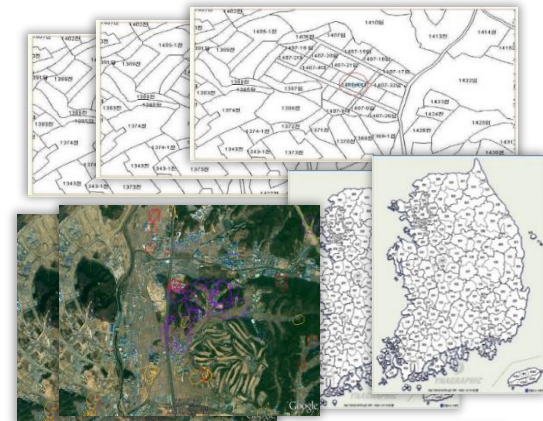
(The Economist, 2010.02)



Geocoding



Structured Data



Unstructured Data

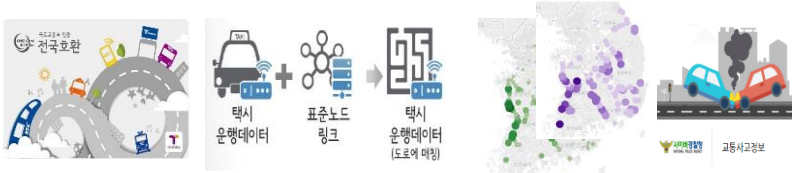
What Kinds of Geospatial Big Data are Available?

Public Sector

Public Open Data of National Priority



Transportation Big Data

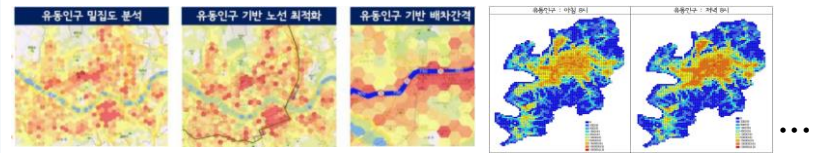


Geospatial Big Data System of MOLIT

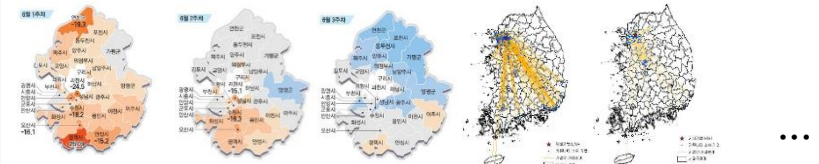


Private Sector

Mobile Population Data



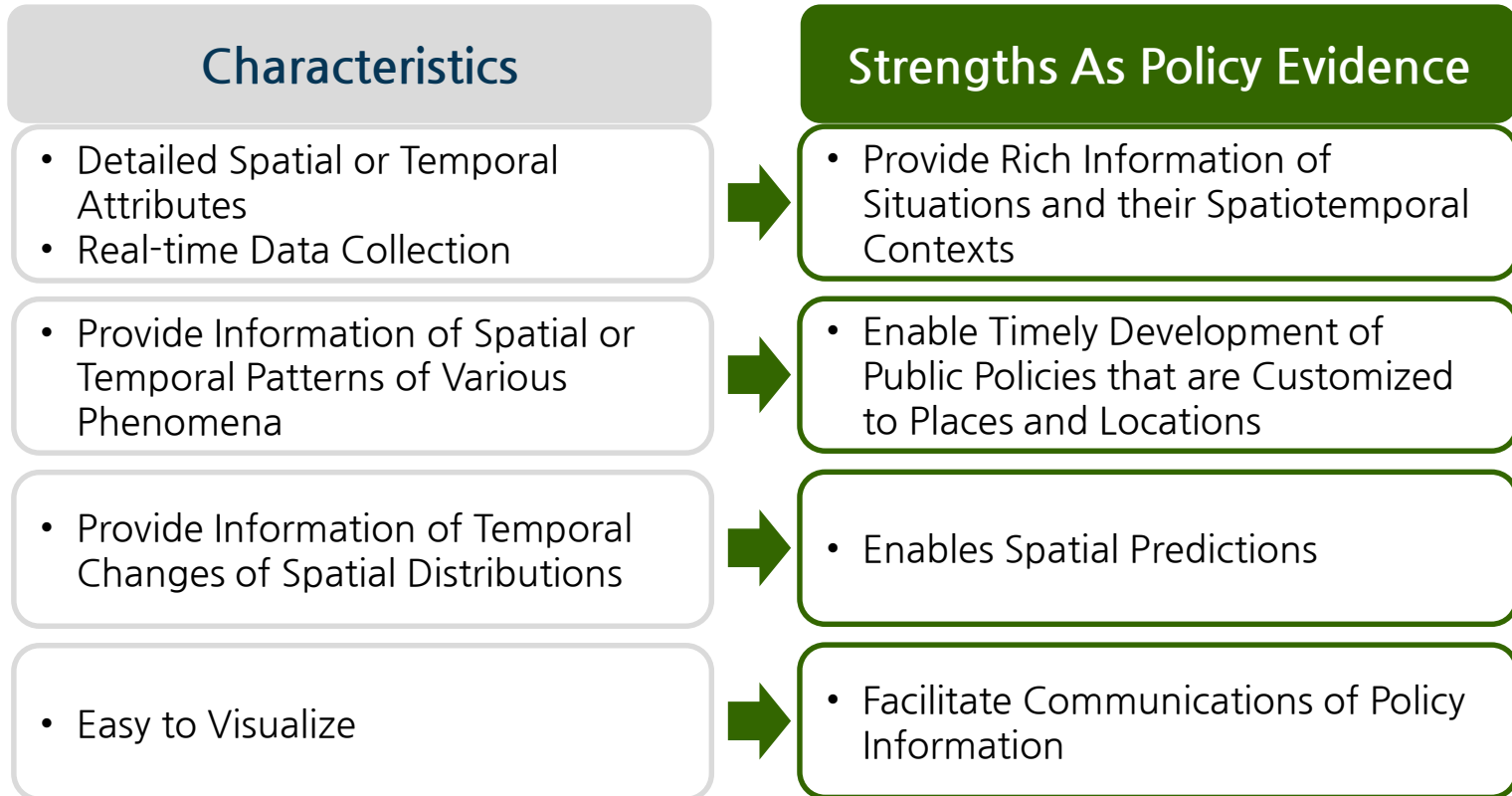
Credit Card Sales & B2B Transactions Data



Social Media Data



Characteristics and Strengths of Geospatial Big Data



+ Other Characteristics of Big Data

Policy Contexts of Geospatial Big Data

Evidence-based Policy Making Towards Open, Innovative Gov.

Institutional Foundation

Ordinance of Big Data Use (Kyunggi-Do, 2015)

Advance Legislation Notice of The Data-based Public Administration Activation Law (Ministry of Public Administration and Security, 2017)



Infra/Data Development

Opening National Spatial DB
National Geospatial Big Data Sys.



Big Data Common Infra



Applications

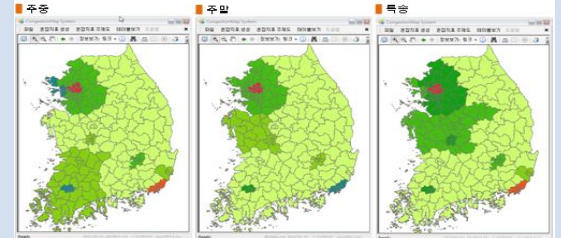
Policy Support Mapping



Smart Big Board for Disaster Response

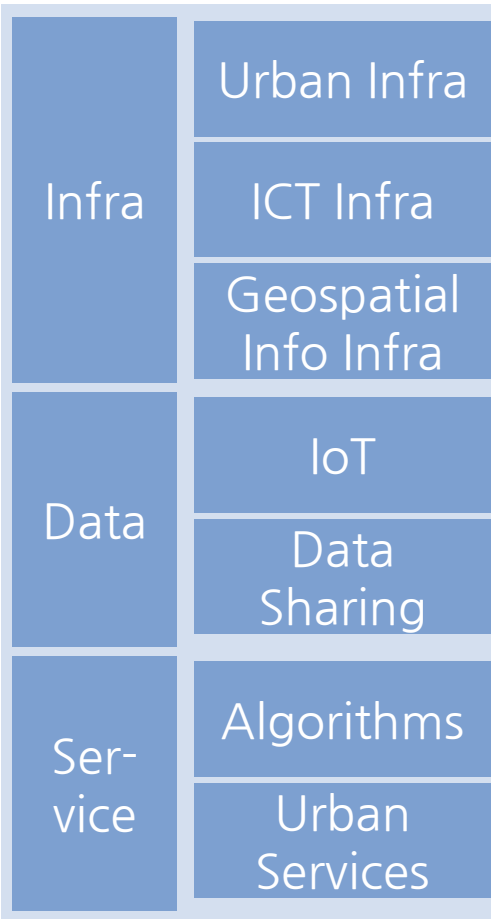


MOLIT, Traffic Congestion Map



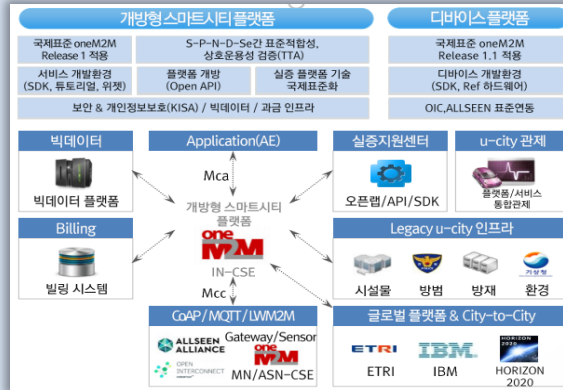
Developing Smart Cities As IoT-based Living Platform

Key Technologies For Smart City

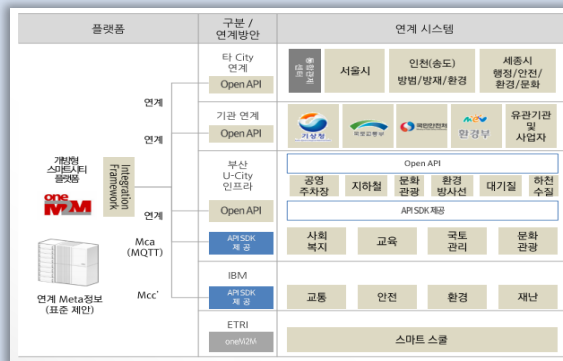


Open Platform Develop. Linking Platforms

Open Standard Smart City Platform



Linking Smart City Platform



Demonstration Complexes

Inchon, Songdo



Sejong



Anyang



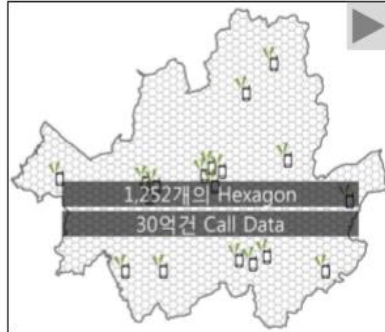
Public-sector Applications to Solve Urban and Regional Problems

Seoul Transportation Stories - Late-night bus route setup

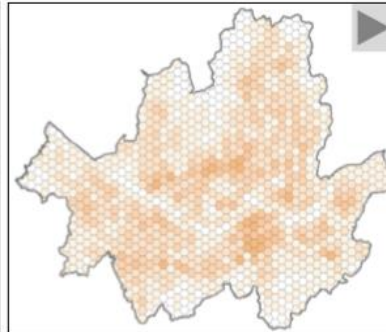
Big data problem definition



Modeling



Analysis



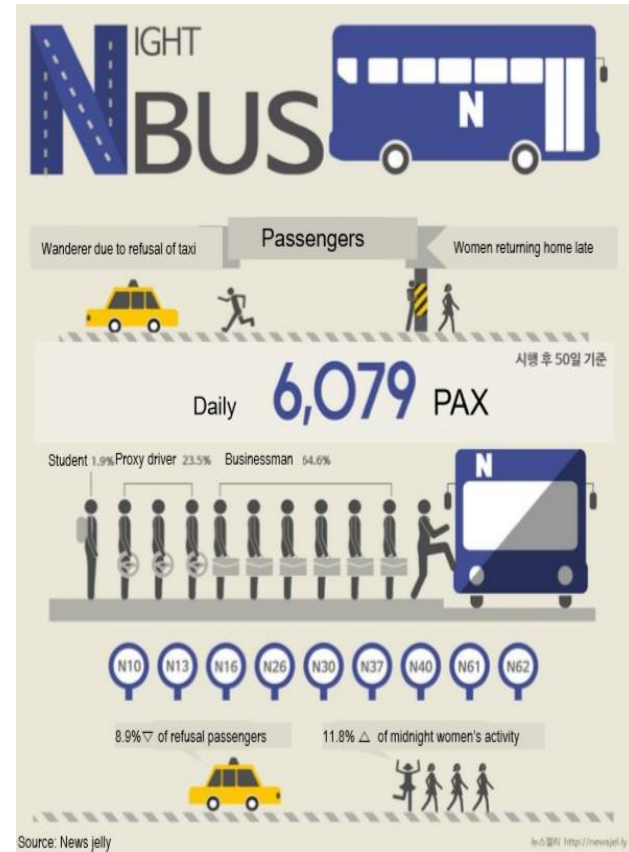
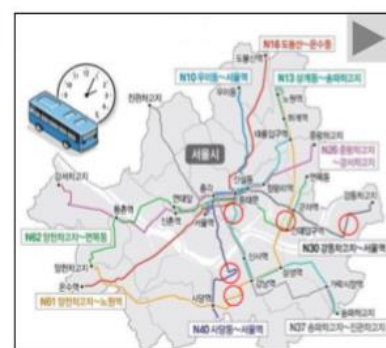
Night bus routes



Routes optimization



Finalized routes



Source: Ki-Byoung Kim, 2016, Big Data for Preparing Policies and Public Services - Best Practices in Seoul Metropolitan Gov.

Seoul Transportation Stories - Taxi Matchmaking

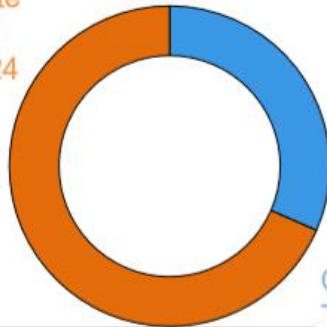


Why Taxi Matchmaking?

- According to 120 Seoul Dasan call center
- - 25.5% of the citizens' complaints are on transportation!
- Among them, 73.5% are related to taxis!

Status of taxi registered in Seoul

Private
Taxis
49,424



Subsidy \$150M / year

Corporate
Taxis
22,801

Response of the City

*Provide more supplies of taxis,
without additional no. of taxis*

- Taxi DTG (Digital Tacho-graph)

- X,Y coordinate, height, date, heading, speed, status per 10 secs
- Data are collected in every 150 seconds



Facing Problems

It seems to be short supply of taxi
during 11PM to 1AM

while Taxis in Seoul are oversupplied

Seoul Transportation Stories - Taxi Matchmaking

Original problem(big problem) → Big data problem(small, manageable problem)
 More taxi supply without increasing no. of taxis Decrease vacancy rate of taxis

Big data problem definition

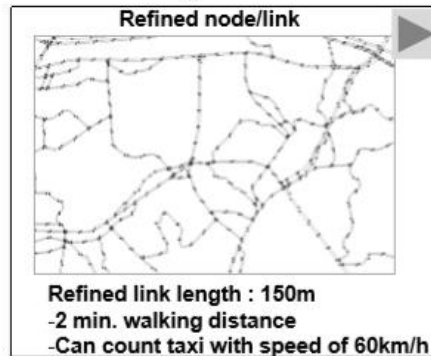


No vacant taxis during 23-01hr

Vacant rate is HIGH!

Instead of providing more taxis, what about reduction of vacancy rate?

Modeling



Refined node/link

Refined link length : 150m
 -2 min. walking distance
 -Can count taxi with speed of 60km/h

Analysis

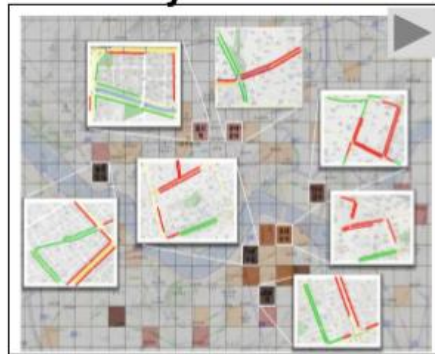


Expecting ...

5% More Chance To Catch A Taxi

10% Dec. In Empty Rate Of Taxi

Vacancy vs. Demand



Policy preparation



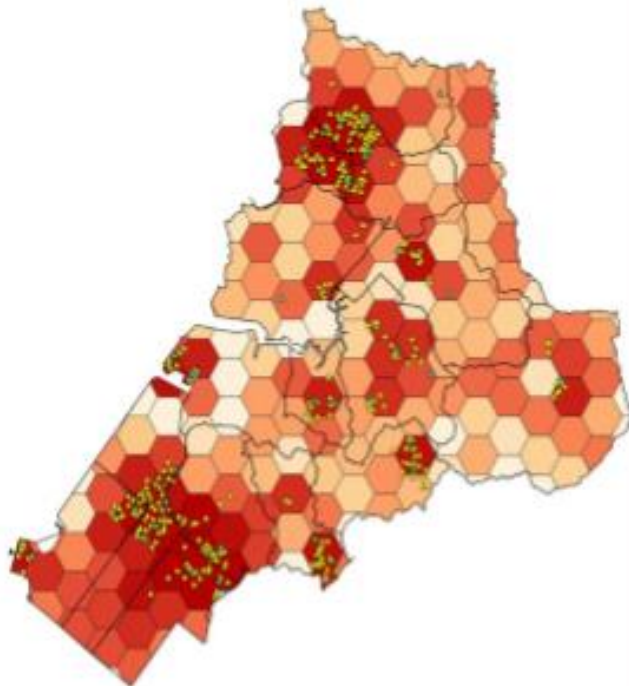
Reinforcing eco-system



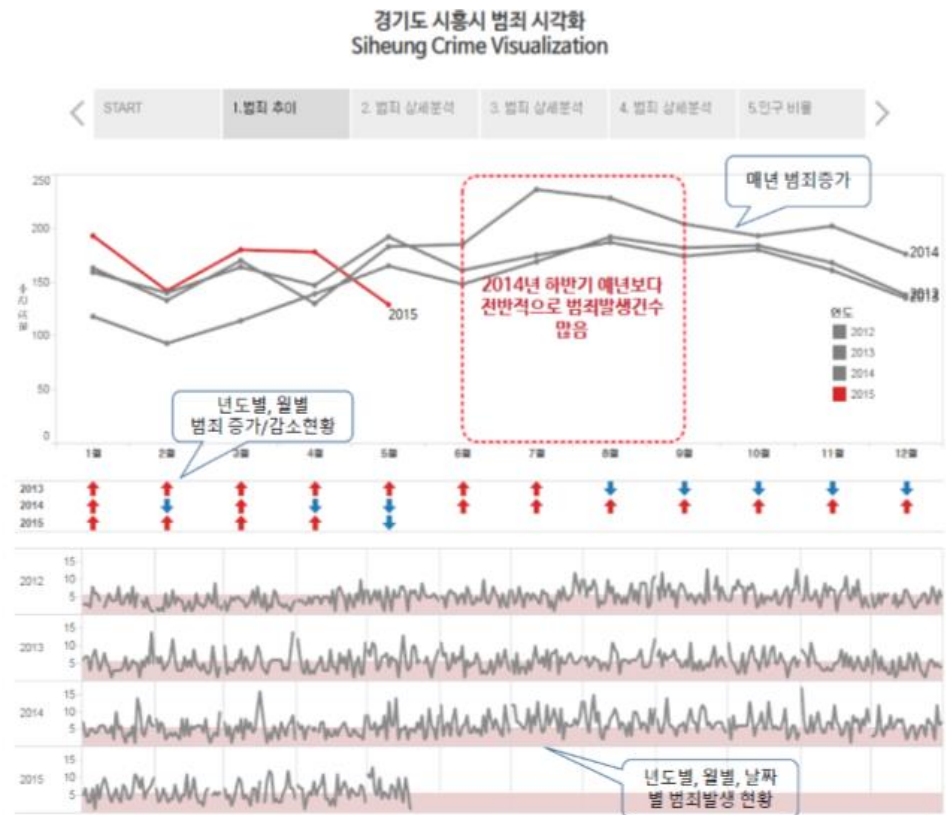
Public Safety Story of Siheung City

Identifying Priority Patrol Areas for Children Protection & Periods for Intensive Patrol

1.6M Crimes



Green: Child Protection Facilities
 Yellow: Daycare Centers, Kindergartens, Elementary Schools

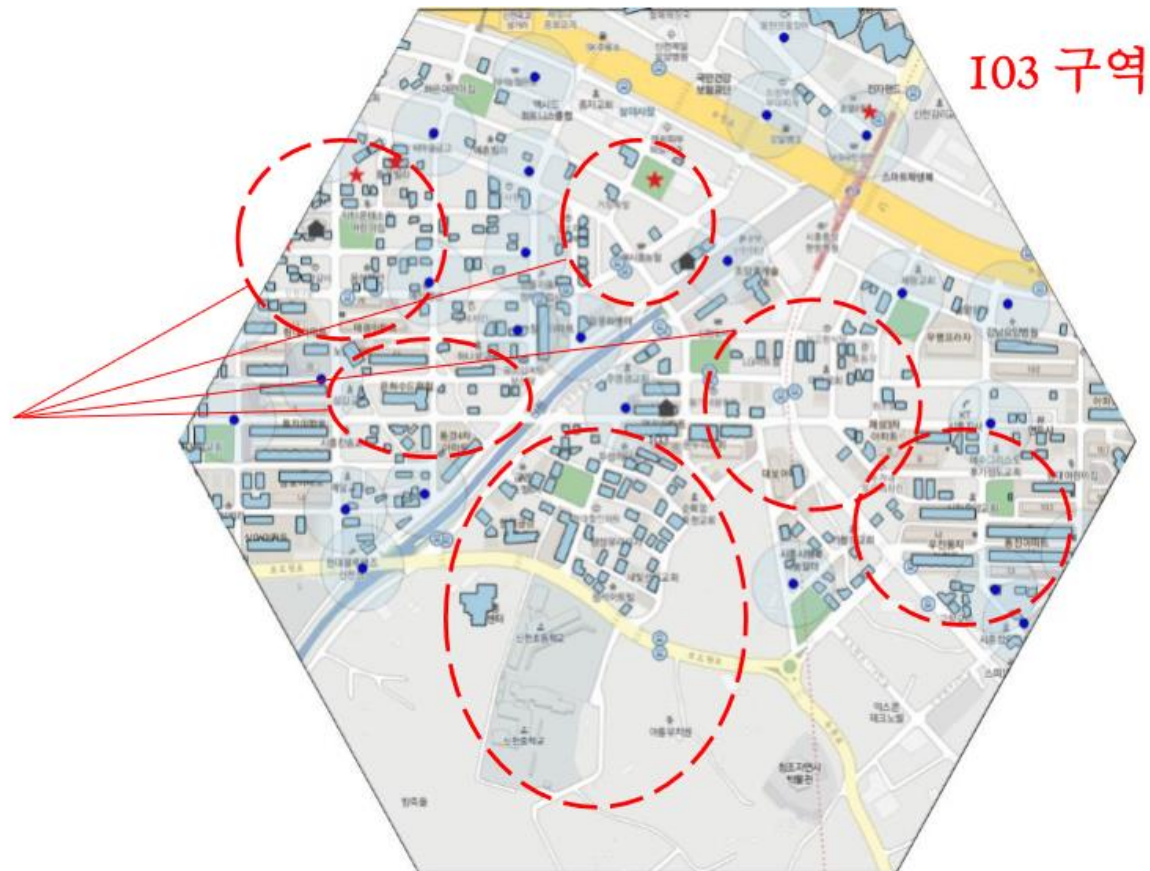


Source: Wansub Cho, 2017, Understanding and Applications of Big Data.

Public Safety Story of Siheung City

Identifying Blind Spots of CCTV Monitoring

High Numbers of
Students &
Residence of Sexual
Criminals &
Over 4 Cases of Child-
related Crime Nearby,
Yet Blind Spots of CCTV
Monitoring



Source: Wansub Cho, 2017, Understanding and Applications of Big Data.

Accessibility to Public Medical Facilities in Sungnam City

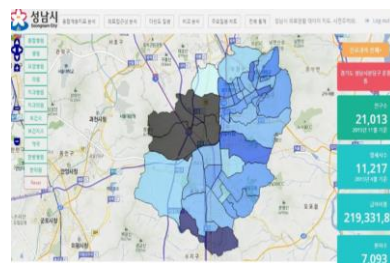
Data & Analysis

Data Collection

Medical Records
(Public)

Socioeconomic Stats
(Private)

Administrative Records Of Residents, Facilities,
Welfare Status (Local)



Analysis Method

Accessibility
To Medical
Facilities

Medical
Vulnerability
By Regions

Blind Sites
Priority Targets
For Family
Doctors

Policy Evidence

구분	인구 천명당 의료공급량(100분위 환산)			구분	인구 천명당 의료공급량(100분위 환산)		
	병상수 기준	의사수 기준	유합계층지표		병상수 기준	의사수 기준	유합계층지표
상남시	54	42	31	상남시	54	42	31
주왕구	56	29	57	금광2동	49	49	42
신촌1동	100	62	78	온평1동	28	12	42
신촌2동	48	23	44	온평2동	33	35	46
신촌3동	75	80	73	신대원1동	39	29	44
태평1동	53	21	52	신대원2동	69	49	80
태평2동	53	30	89	신대원3동	39	40	80
태평3동	72	38	63	하대원동	41	19	28
태평4동	44	19	71	도촌동	28	23	41
수진1동	89	52	75	분당구	61	62	16
수진2동	44	23	44	문당동	60	46	12
신대동	44	19	40	문당1동	61	84	6
신성동	44	22	75	수내1동	62	47	3
임지동	60	21	54	수내2동	58	48	17
북경동	44	20	20	경지동	60	57	16
신촌동	44	14	16	서현동	68	95	7
고동동	44	11	37	이매동	60	46	6
시흥동	44	11	31	아담동	58	58	20
중원구	42	36	49	관교동	58	51	3
성남동	46	58	39	삼평동	62	100	30
중앙동	55	62	59	백현동	58	46	41
금광1동	28	24	68	금곡동	69	75	29
				구미동	64	59	13
				운중동	58	51	11



Implications

Implications

- Smart Use of Urban Geospatial Big Data Provides Policy Insights That Can Change How Citizens Live
 - Geospatial Big Data Can Become The Voice of Smart City, Which Shows Who Has What Problems Where When Why
 - Combined With Urban and ICT Infra, Insights from Smart City Data Can Be Transformed Into Policy Actions and Daily Services



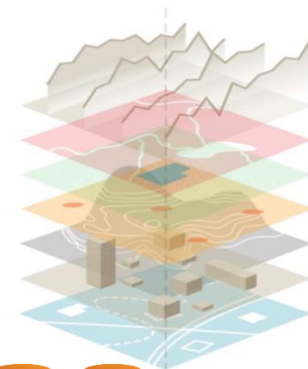
*“The goal is to turn data into information,
and information into insight.
... and insight into actions and then value.”*

- Dan Paull, CEO PSMA Australia

Implications

■ Develop Infra That Can Produce Actionable Data From Smart City Data Farms

- Change Passing-by Data To Data Assets
- Enable Linking of Data from Various Sectors and Systems Through Central Access Points, Standardization, and APIs
- Place Is Key to Linking and Integrating Diverse Data So As To Derive Info (Tag Location)
- Open and Share Usable Data (e.g., Linked Open Data)



■ Build Analytical Capability

- Train Talents With Analytics of Data, Urban Spaces, Human Behaviors, Administration
 - Require Comprehensive Training of Hardware, Software, Wetware
- Foster Abilities of Shifting Viewpoints & Communication/Collaboration
 - “What Problems Do Citizen Have In Daily Living?”
 - “What Problems Does Our Urban System Need To Solve?”
 - “What Information Can We Derive From What Data?”, “How?”
 - “Which Infra Should We Change?”, “How?”, “What Policy Measures?”

Thank You

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