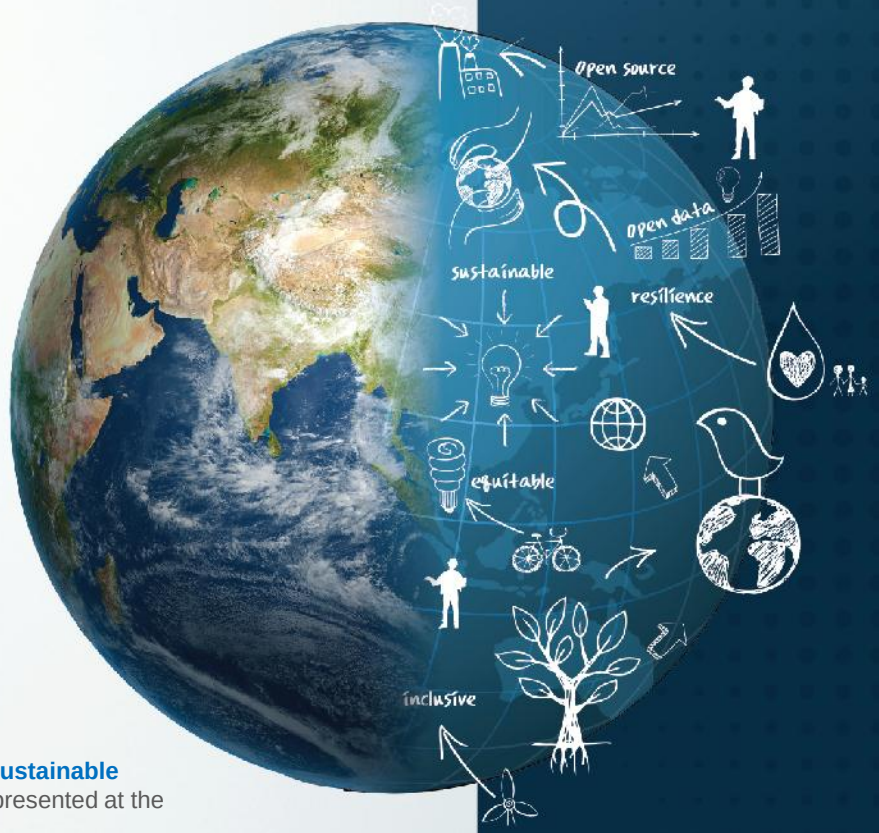
UN-GGIM-AP, UN-ESCAP, UN-HABITAT/GLTN

Joint Workshop on Land Administration and Management

Open Source GIS for Rapid Urban Growth and Land Management



DATE | **October 5, 2015**

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Spatial Information Office

Korea Land and Housing Corporation(LH)

This presentation is based on **"FOSS4G for Rapidly Urbanizing Cities and UN Sustainable Development Goals(SDGs); SDG 11 Cities and Human Settlement"** which was presented at the FOSS4G Seoul 2105 UN special session.

CONTENTS

#1
SDG and Open Source GIS

Planet earth and UN SDG

- From 7 UN Millennium Development Goals(MDGs) to 17 UN Sustainable Development Goals(SDGs)
- Achieving the sustainable, inclusive, resilient and equitable planet earth through the UN SDG until 2030
- What is needed to achieve the UN SDG goals and how to achieve the goals
- SDGs are goals both for developing and developed countries
- Open source and open data can contribute the worldwide SDG goals

GIS in SDG

- **SDSN(Sustainable Development Solution Network) report**
  Geographic detail, disaggregated by geography
- **Rio + 20 Outcome document**

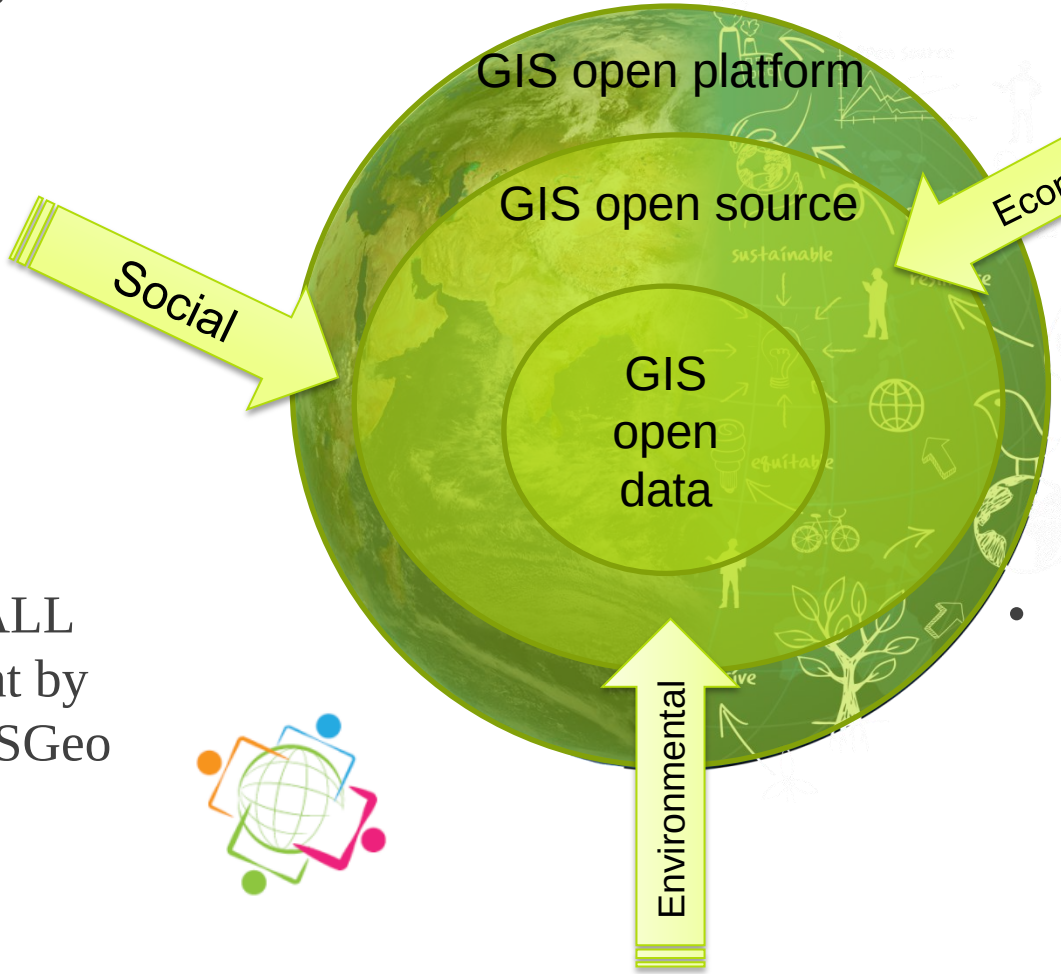
"The future we want" specify
the Recognized
the importance of

"Space technology based data in situ, meaning and reliable geospatial information for sustainable development, policy making, programming and project operation"

Possible use of Open Source GIS

- Role of ICT as tools for achieving SDGs

- ODA and ICT for bilateral and multilateral development cooperation



- Geo for ALL movement by ICA & OSGeo initiative

- GIS open source data and S/W competing measures for SDGs

#2
Benefits of FOSS4G in Urban Field

UN SDG #11 plus SDG #9 ▶ Urban SDG

Sub Goals
11.1 Affordable housing ,
11.2 sustainable transport systems
11.3 Human settlement planning
11.4 Cultural and natural heritage
11.5 Decrease disaster
11.6 Environmental impact of cities
11.7 Green and public spaces
11.a Nat'nl & regional dev. planning
11.b Hyogo Framework
11.c Sustainable & resilient buildings

Sub Goals
9.1 Resilient infrastructure
9.2 Sustainable industrialization
9.3 Access of small-scale industrial
9.4 Upgrade infrastructure
9.5 enhance scientific research
9.a Resilient infrastructure dev.
9.b Domestic technology dev.
9.c Increase access to ICT

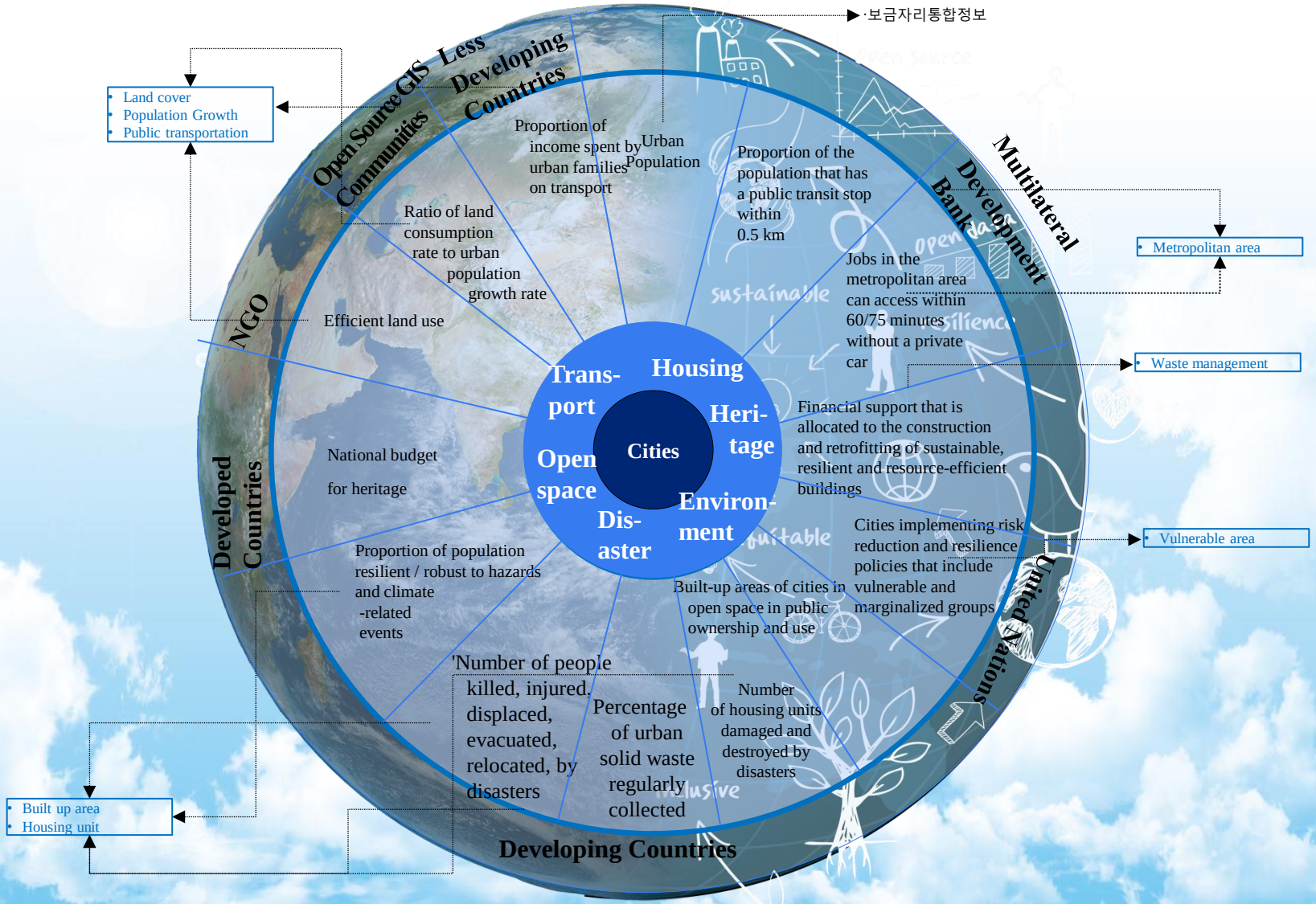
Urban initiatives and Indicators

The wheel of urban prosperity (UN Habitat, 2012)

Emerging Sustainable Cities Initiative(www.iadb.org)

- **Measurable Indicators matter for spatially related issues**
- **Urban SDGs need Measurable Indicators**

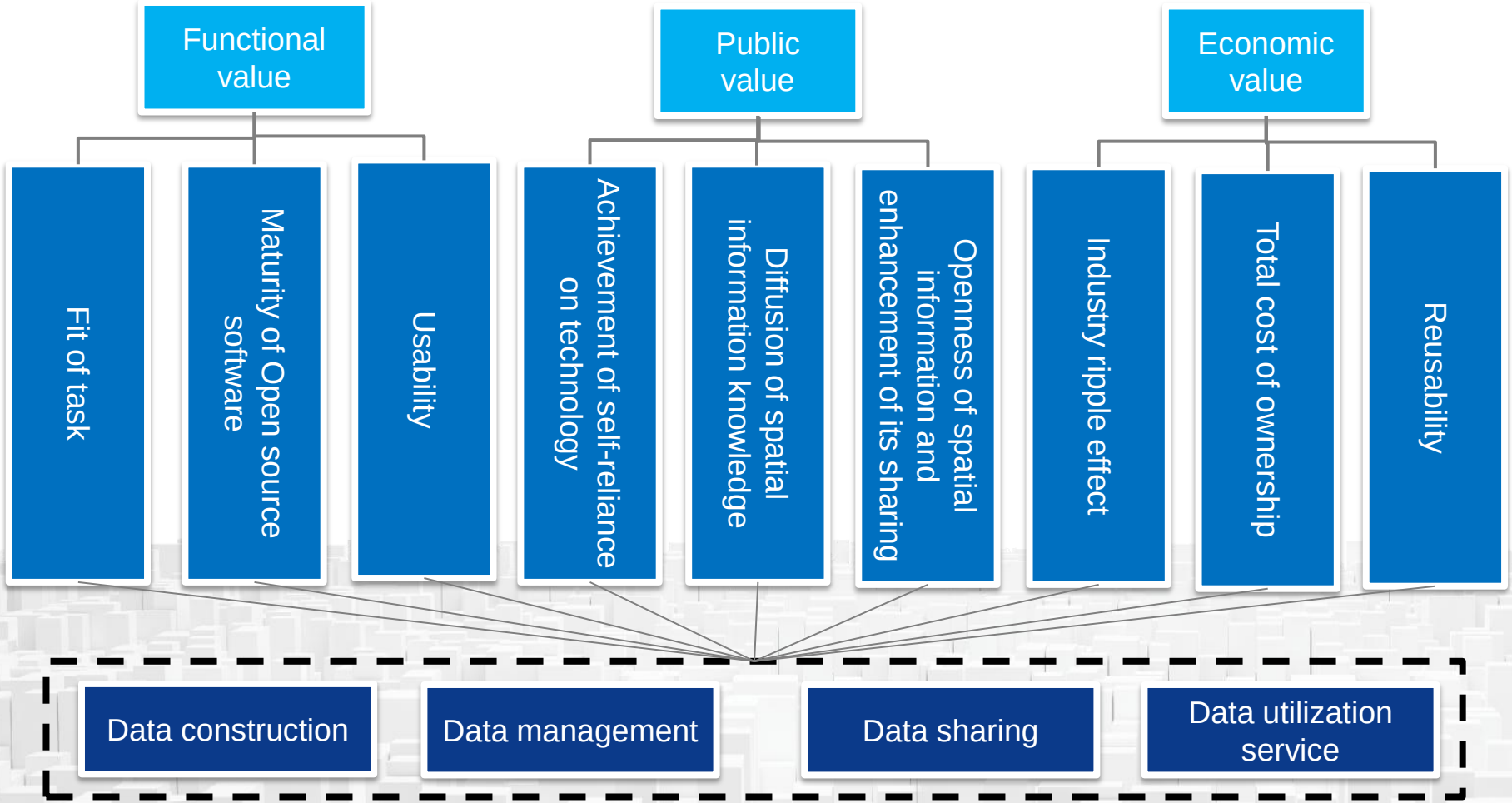
Measurability
Quantifying the indicators using GIS



GIS Open Source S/W & Data

- **Comprehensively collecting various field's time series spatial data**
  population, housing, land cover, environmental, ecological, infrastructure, river etc.
- **Open data accessibility**
  Any one can access and it needs a accountability in case of public domain data
- **Easy work orchestration with open source data and FOSS4G**
  Disaggregated analysis, combine text data like statistics
- **Weak data infrastructure form spatial information divide of developing countries**
  Use of remotely sensed data in those countries
- **Solutions to technological issues**
  Standardizations like coordinate systems and data

Benefits of application in Urban Field



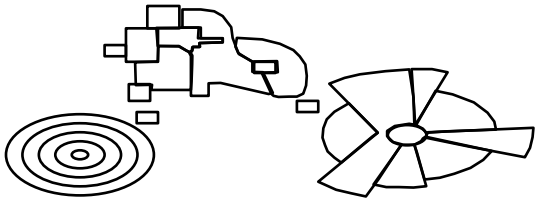
Source: Adapted from Junyoung Choi, Jaeseong Ahn, Hyungtae Kim, 2015

#3 FOSS4G for Rapidly Urbanizing Cities and Land Management

Rapidly urbanizing cities

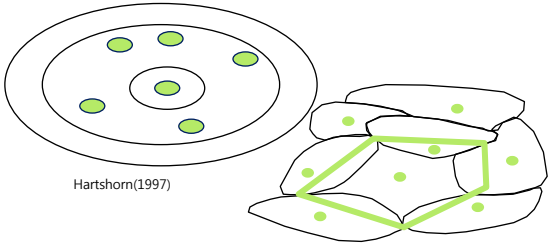
Traditional urban structure

- Concentrated to a urban core
- Multinuclei,

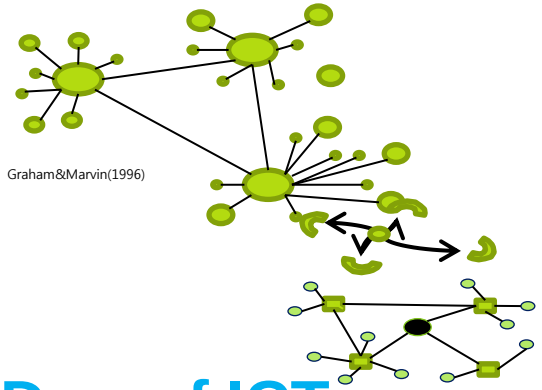


Motorization

- Suburbanization
- Urban-region



Hartshorn(1997)

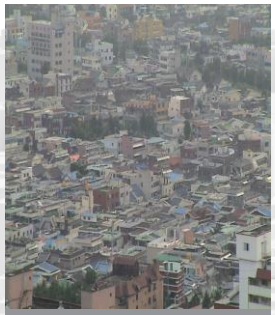


Graham&Marvin(1996)

Dev. of ICT

Hartshorn(1997)

- Decentralized, Decentralized concentration, etc.
- Urban network



Housing Shortage

Transportation

Disaster/ Crime

Environmental pollution

Energy

Community Spirit

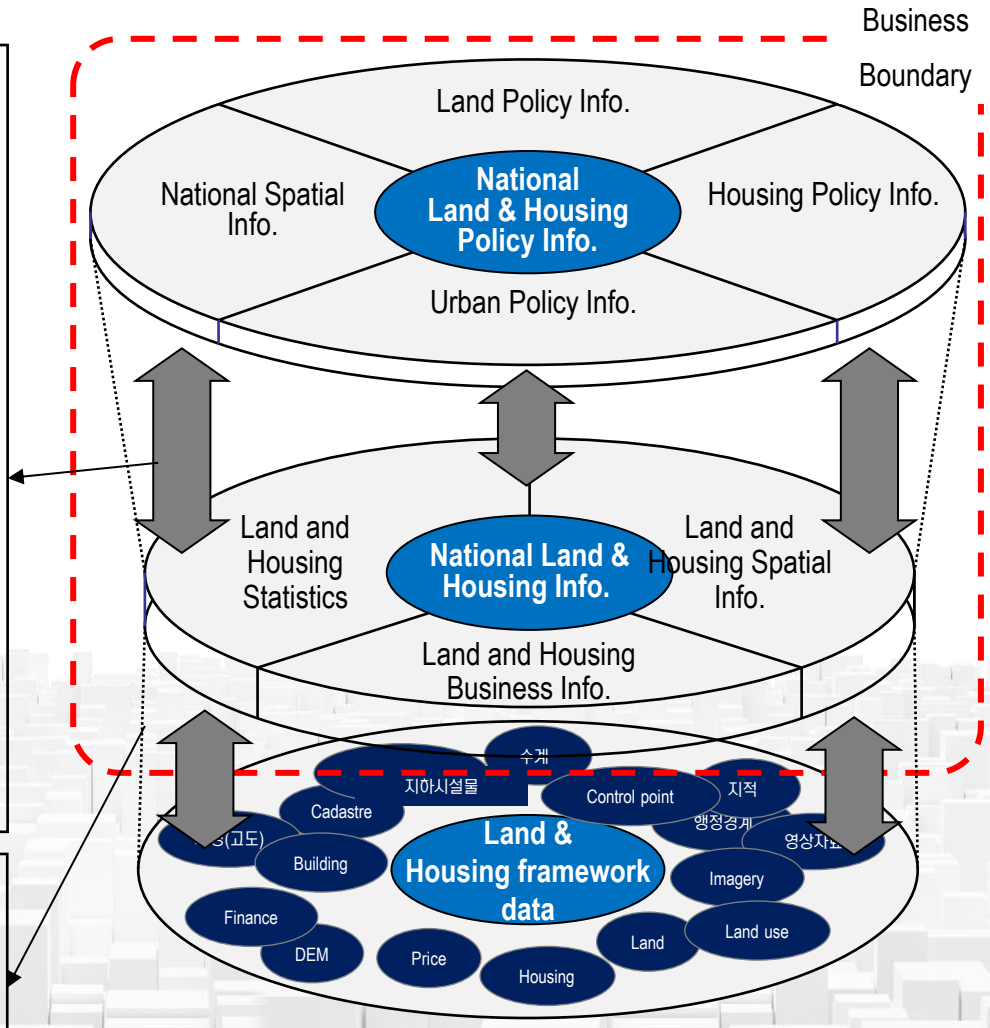
Urban field Application – Korean Case

• **Land and Housing Policy support Systems**

- **National Spatial policy Information** : **National Spatial Data Infrastructure(NSDI) system**, GIS based integrated building information, Spatial Big Data system(on-going) etc.
- **Land Policy Information** : **Korea Land Information System(KLIS)**, Real estate Transaction Management System(RTMS), Land for Housing information system, Onnara Real Estate Information Portal, etc.
- **Housing Policy Information** : **internet based Architecture Information System(e-AIS)**, Housing supply statistics information system, Bogeumjari housing integrated information system, Rental housing information system, Housing allowance information system, etc.
- **Urban Policy Information** : **Urban Planning Information System(UPIS)**, Land suitability assessment, Restricted Development Zone Management Information System(RDZMIS), Land Use Regulation Information System(LURIS), factory location support system, etc.

• **Land and Housing Information**

- Land and Housing Spatial Information
- Land and Housing Business Information
- Land and Housing Statistics



Tacking issues with GIS and Big data

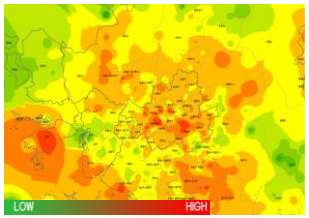
Could Big Data provide alternative measures for poverty and welfare?

Affordable Housing demand

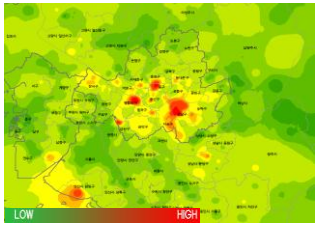
Mobile phone data
&
Consumer credit scoring data

Low income group

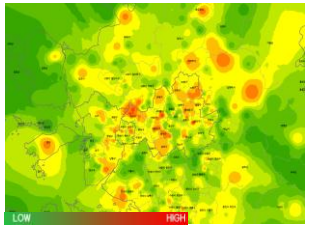
Senior citizen households



Someone who is just starting out in a career

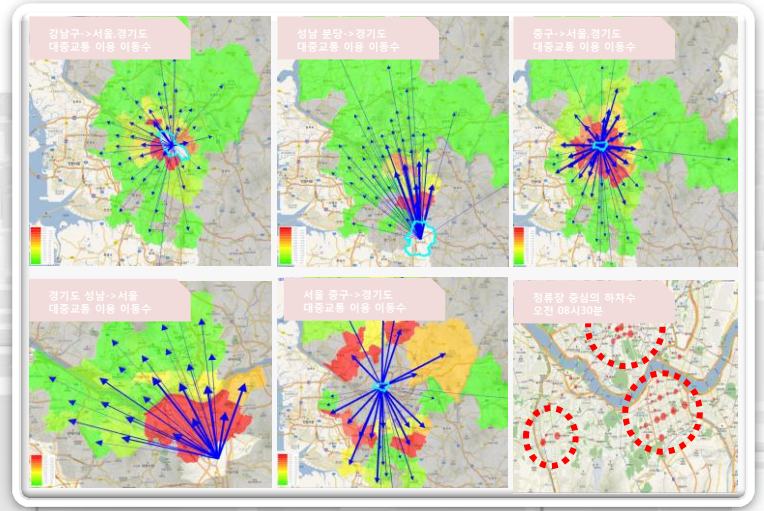


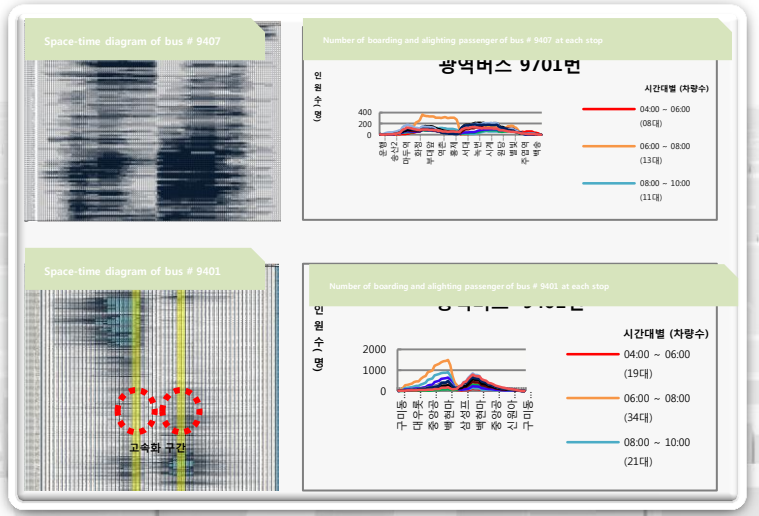
University student



Mass transit planning

Transportation smart card





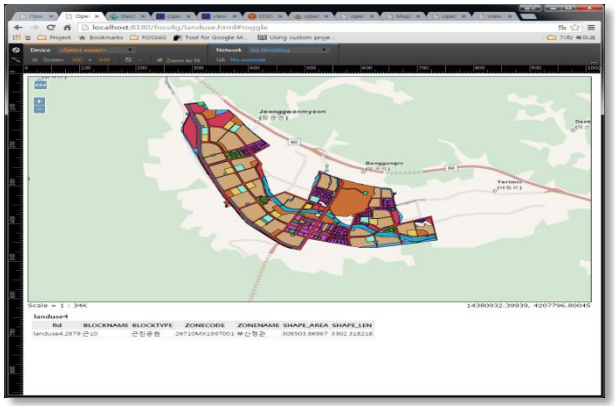
FOSS4G application in urban field: Examples

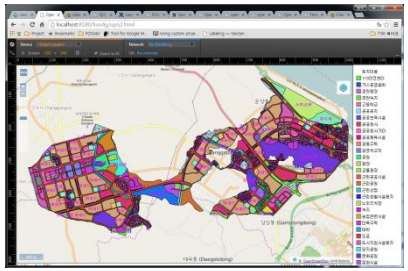
	Some Project	Data	Inter-face	Open Source Applied					Spatial data processing tech.
				Client	Server	DBMS	LIB	Framework	
Urban Infra	Water supply network management system of a Korean local gov.	Raster/ Vector	WMS/WFS	Open layers2	Geo Server	MySQL	Geotools		Processing and representation of line data using Geotools, need additional data handling like insert water supply network
	Hazardous material safety transportation management system of a Korean gov.	Raster(Open API)	WMS, Vector using native coding	Open layers2		MySQL			Link external data using Open API which is needed to monitor the hazardous vehicle
Urban Environ-ment	Geobolivia		WMS, WFS, WCS, CWS, T-WFS	Mapbuilder, Intermap, Kamap, Openlayers	Geo Server, MapServer, Deegree, Geonetwork	PostGIS, MySQL			
	Online What If Planning Support System				Geo Server	Postgre SQL, Post GIS, Couch DB	Geotools		Computing Fire Behavior Using selecting fuel models, adjusting and conditioning the fuel to the environment and computing the "fine" fuel moisture content based on solar heating combined with the cooling effect of wind
Urban Analysis	Wildfire management tool(WMT), World Wind project		REST	WebGL, Globe	WMT REST Service 2)	MySQL	Web World S 아, RequireJS, Jquery, Prime-UI, Bootstrap	Word Wind	
	Word Bank PUMA 1)	Google map		Google Maps API, Openlayers2, ExtJS	Pycsw(OGC CSW Server Implementation)			Geonode	

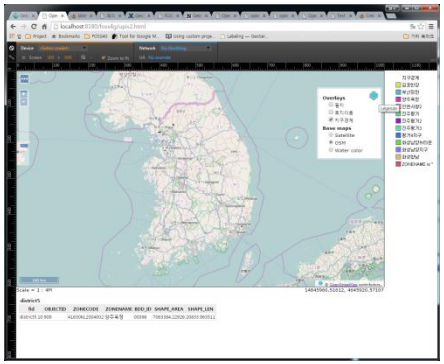
1) PUMA: Platform for Urban Management and Analysis
2) CPS internally uses WMS Map Servers, USGS Landfire Servers, etc.

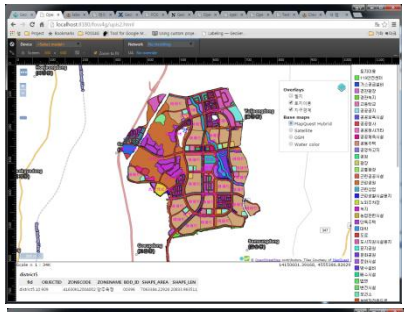
Pilot study

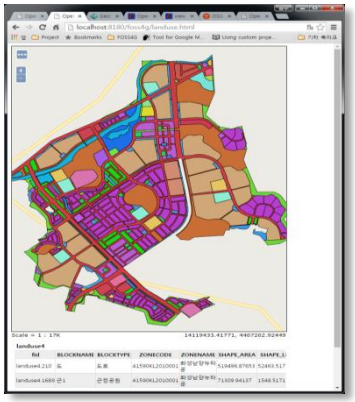
- Land use for new town development by Korean Land and Housing corp.
- Accessible and analyzable to open data like Open Street Map, Bing map, etc.

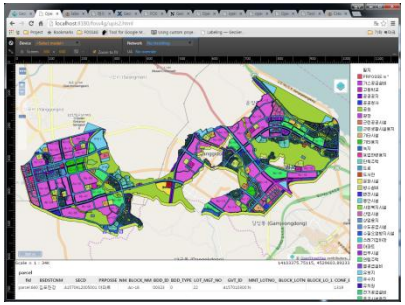


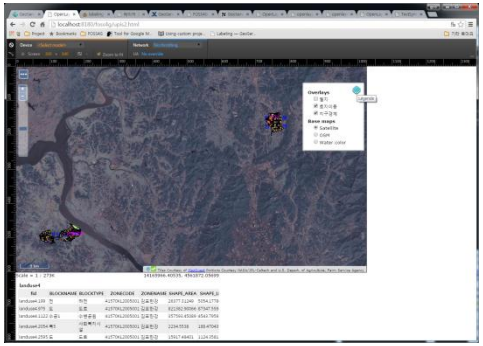












#4

What can we do for the future

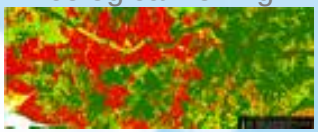
Setting adequate spatial measurements

Provide alternative urban spatial measures between regions

Dev. Restricted Zone

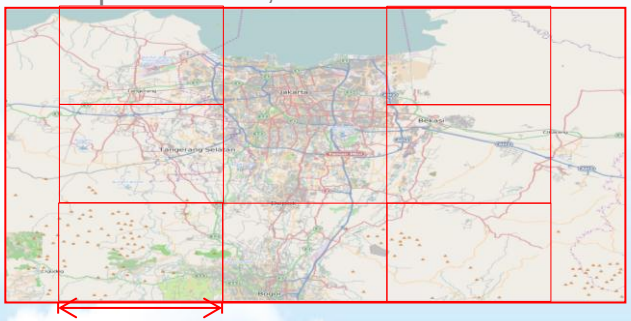
Urban Plan Information

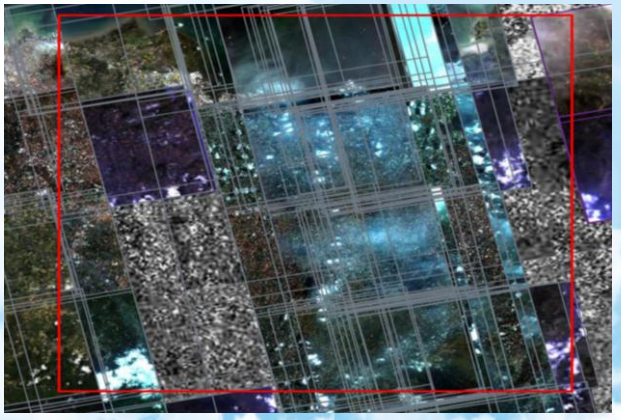
Ecological zoning



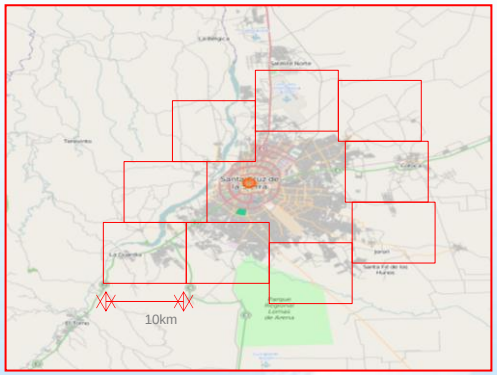
Level of public transit supply

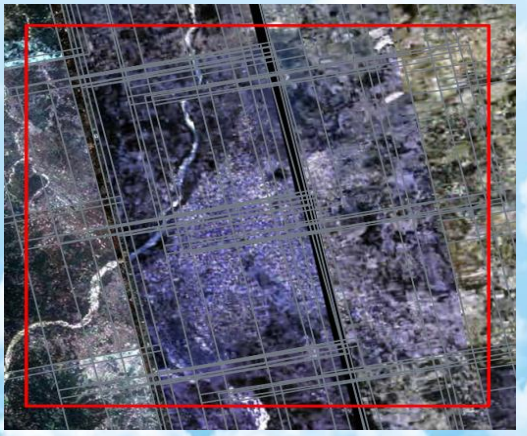
Sprawl around Jakarta Metropolitan Area, Indonesia





Sprawl around Santa Cruz, Bolvia





Base map : Open street map
Imagery: arirang.kari.re.kr

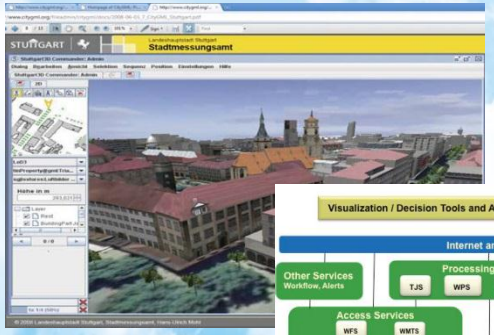
Smart Cities, Open Standard

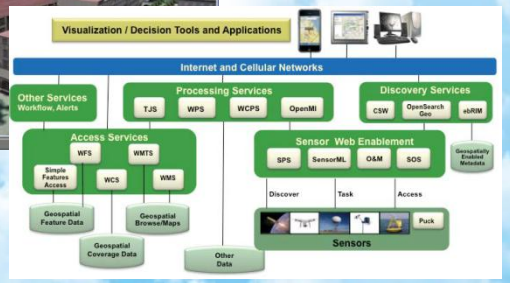
<OGC Smart Cities Spatial Information Framework>

- **ISO/DIS 37120 Sustainable development and resilience of communities Indicators for city services and quality of life**
  - Economy, Education, Energy, Environment, Recreation, Safety, Shelter, Solid waste, Telecommunications and innovation, Finance, Fire and emergency response, Governance, Health, Transportation, Urban planning, Wastewater, Water and sanitation

Location is primary method for organizing Smart City Services

- **Smart Cities and Spatial technologies**
  - Framework for authoritative data → CitGML and GML Coverages(IndoorGML, InfraGML)
  - Access and processing of geospatial information → OGC service-oriented architecture





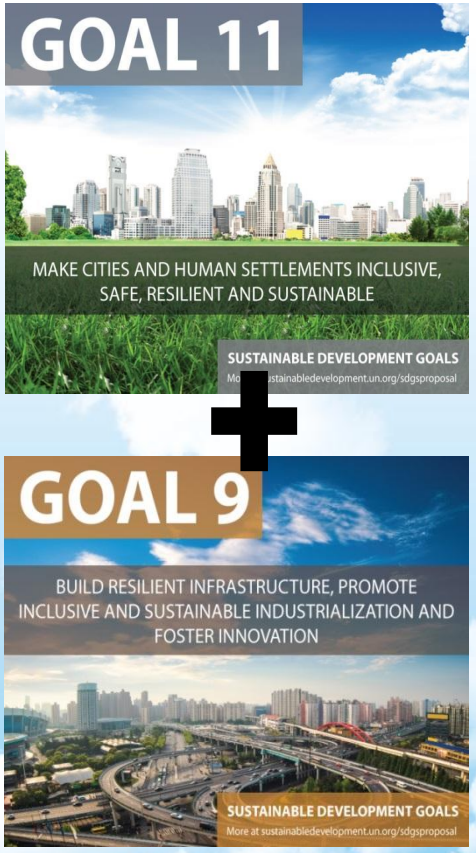
Cooperation to implement the tasks

- **Cooperation of stakeholders**

✓ Working group: United Nations(Geospatial information dept., UN-HABIT, etc.), Governments, MDBs such as WB, ADB, IDB, etc.

✓ Trust fund : Money for the action

Supportive goals



"Realization of Urban SDGs using the geographically disaggregated spatial measurements"

Urban SDGs can be achieved using the open, free and affordable spatial technologies, Open Source GIS or Free Open Source for Geospatial

THANK YOU