# *Annex-15 NSDI Workshop Materials*

**SURVEY OF BANGLADESH**
**SURVEYOR GENERAL OFFICE**
**TEJGAON, DHAKA - 1208**
**Phone: 9114191 Fax: 9117463**
**info@sob.gov.bd,www.sob.gov.bd**

SOB/14-C/NSDI Meeting/P- 2251

Date: 31 August 2017

**From**

Surveyor General of Bangladesh
Survey of Bangladesh
Shaheed Tajuddin Swarani, Tejgaon, Dhaka-1208

**To**

As per the Distribution.

**Subject: Invitation to attend Workshop on "Pilot project and System Design Concept for NSDI construction in Bangladesh" to be held on 12 September 2017 at 09:30 am**

**Ref:**

1. JICA Letter dated 29 August 2017.
2. Survey of Bangladesh letter no: SOB/14-C/NSDI Meeting/P-2251 dated 27 July 2017.
3. Survey of Bangladesh letter no: SOB/14-C/NSDI Meeting/P-1362 dated 02 May 2017.
4. MOD letter number 23.00.0000.220.25.001.16.639 dated 24 November 2016.
5. Record of Discussion between JICA and Authorities concerned of the People's Republic of Bangladesh (MOD, MOF and SOB) dated 27 August 2013.

**Dear Sir/Madam,**

An international Seminar on "National Spatial Data Infrastructure (NSDI) for Bangladesh" organized by Survey of Bangladesh (SOB) of Ministry of Defence (MOD) and assisted by Japan International Cooperation Agency (JICA) was held on 1st and 2nd June of 2016 at Dhaka. Sheikh Hasina, the Honorable Prime Minister (PM) of Bangladesh, inaugurated the seminar and gave away her guidelines to create awareness and importance of NSDI among all Contributors. Accordingly two contributors meeting was held on 15 May and 9 August of this year, where so far progresses of NSDI, draft road map plan and NSDI pilot project construction since the seminar were discussed. Large infrastructure like NSDI demands more numbers of meetings, workshops and seminars.

With this backdrop, JICA with the assistance from SOB is going to organize a workshop principally focusing on the 'Pilot project and system design concept for NSDI construction' and discussion on 'Utilization of geo-spatial data and road map plan of NSDI construction' as well. **The workshop would take place in the SURMA Hall of Pan Pacific**

**Sonargaon Hotel from morning to afternoon (9.30 am to 3:00 pm)** and Respected Secretary, MOD is likely to be the chief guest of the session. It is my pleasure and honor to invite one of your senior representatives (where applicable) to participate in the workshop. We deeply appreciate your long stretched contribution on the geo-spatial activities in Bangladesh. Presence of your resource person will surely promote the activities in establishing SDI for our Nation. In this regard, please send us the name of the participant from your organization by 06 September 2017 following the table given below. Apart from the paper copy, you may also send the electronic copy of your nomination letter to our official email (info@sob.gov.bd).

| Name of the Participant | Position in the office | Name of the Organization | Mobile Number | E-mail ID |
|---|---|---|---|---|
| | | | | |

The proposed Agenda for the meeting is given as an annexure to this letter for your concern. We eagerly look forward to your contribution on this workshop.

**Sincerely Yours,**

**Brigadier General Zakir Ahmed, psc**
Surveyor General of Bangladesh

E-mail: sg@sob.gov.bd

**Annexure:**

Agenda for workshop on 'Pilot project and system design concept for NSDI construction' in Bangladesh

**Distribution (Not following seniority):**

1. Secretary, Ministry of Defence (MOD)
2. Director General, Bangladesh Bureau of Statistics, (BBS)
3. Director, Bangladesh Metrological Department (BMD)
4. Chairman, Space Research and Remote Sensing Organization (SPARRSO)
5. Prof Md. Mafizur Rahman, Department of Civil Engineering, BUET
6. Chief Engineer, Local Government Engineering Department (LGED)
7. Chief Engineer, Roads and Highways Department (RHD)
8. Chairman, Rajdhani Unnayan Kartripakkha (RAJUK)
9. Director General, Bangladesh Water Development Board ( BWDB)
10. Chairman, Water and Sewerage Authority (WASA)
11. Director General, Geological Survey of Bangladesh (GSB)
12. Chairman, Bangladesh Agricultural Development Corporation (BADC)
13. Director General, Department of Land Record and Survey (DLRS)
14. Project Director, Access to Information (A2I) Programme, PMO's Office
15. Chief Representative, JICA Bangladesh
16. Mr. Toru Watanabe, Team Leader, JICA NSDI Study Team

17. Chief Executive Officer, Dhaka North City Corporation (DNCC)
18. Chief Executive Officer, Dhaka South City Corporation (DSCC)
19. Executive Director, Bangladesh Computer Council (BCC)
20. Director General, Department Of Disaster Management (DDM)
21. Executive Director, Center for Environmental and GIS (CEGIS)
22. Executive Director, Institute of Water Modelling (IWM)
23. Director, Urban Development Department (UDD)
24. Chairman, Bangladesh Road Transport Authority (BRTA)
25. Managing Director, Dhaka Electric Supply Company Limited (DESCO)
26. Chairman, Bangladesh Power Development Board (BPDB)
27. Managing Director, Dhaka Power Distribution Company Limited (DPDC)
28. Chairman, Bangladesh Rural Electrification Board (REB)
29. Director General, Water Resources Planning Organization (WARPO)
30. Director General, Department of Environment
31. Chief Conservator of Forest, Forest Department
32. Director General, Directorate of Primary Education
33. Director General, Directorate of Secondary and Higher Education
34. Vice-Chancellor, Dhaka University
35. Vice-Chancellor, Jahangirnagar University
36. Vice-Chancellor, BRAC University
37. Vice-Chancellor, Sher-e-Bangla Agriculture University
38. Chairman, Bangladesh Inland Water Transport Authority (BIWTA)
39. Chairman, Bangladesh Energy Regulatory Commission (BERC)
40. Chairman, Bangladesh Telecommunication Regulatory Commission (BTRC)

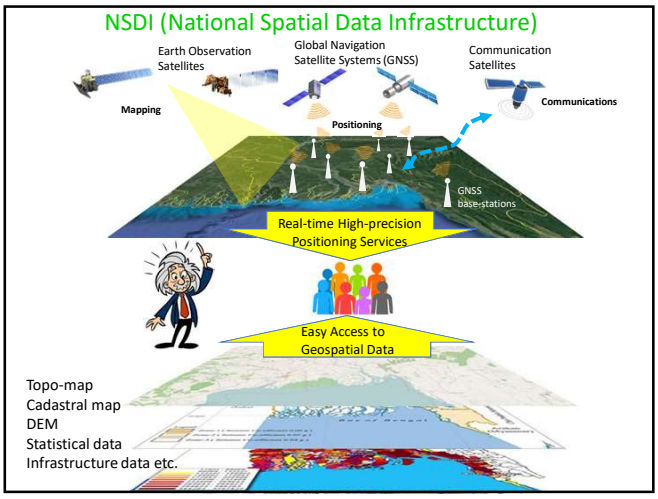
**Annexure**

# AGENDA FOR WORKSHOP ON 'PILOT PROJECT AND SYSTEM DESIGN CONCEPT FOR NSDI CONSTRUCTION' IN BANGLADESH

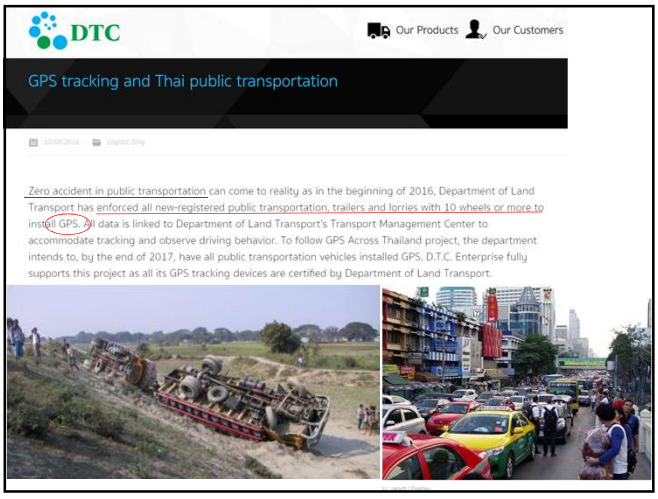
| Ser No | Topic | Speaker/ Responsibility | Time | | Remarks |
|---|---|---|---|---|---|
| | | | From | To | |
| 1. | Opening Speech and Overview | Surveyor General | 0930 | 0940 | |
| 2. | Introduction of the Participants | Moderator/Anchor | 0940 | 0950 | |
| 3. | Key Note Presentation: Introduction of Advanced examples for constructing NSDI in Bangladesh (Tentative) | Prof. Ryosuke Shibasaki, University of Tokyo | 0950 | 1020 | |
| 4. | Key Note Presentation: | Prof. Mafizur Rahman, BUET | 1020 | 1050 | |
| 5. | Overview on the "Survey carried out" and Presentation on "Pilot project and System Design Concept" | JICA Study Team | 1050 | 1110 | |
| 6. | Discussion on Agenda 5. | All | 1110 | 1140 | |
| 7. | TEA | All | 1140 | 1200 | Served outside the Hall |
| 8. | Presentation on Road Map Plan for the Construction of NSDI for Bangladesh | Survey of Bangladesh and JICA Study team | 1200 | 1220 | |
| 9. | Panel Discussion on the "Utilization of Geo-spatial Data, Road map plan and NSDI Pilot Project" | Moderator – Prof.Shibasaki<br>Working Group Members and other Participants | 1220 | 1310 | WG Members may present their speech for 5 to 10 minutes |
| 10. | Summary of the Discussion | Moderator/Anchor | 1310 | 1320 | |
| 11. | Closing Address | Secretary, MOD | 1320 | 1335 | |
| 12. | LUNCH | All | 1335 | 1500 | Served outside the Hall |

# Introduction for Developing an Advanced NSDI of Bangladesh

Ryosuke SHIBASAKI
Professor, Center for Spatial Information Science,
The University of Tokyo

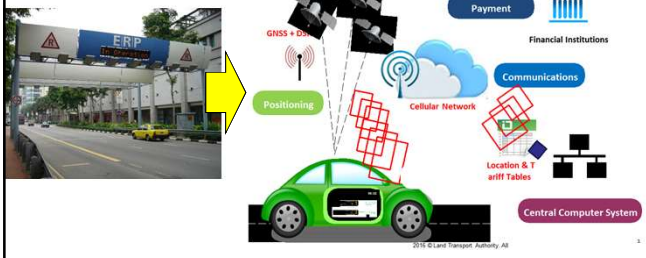






Friday, 18 March 2016

Singapore will have world's first GNSS urban congestion pricing scheme by 2020

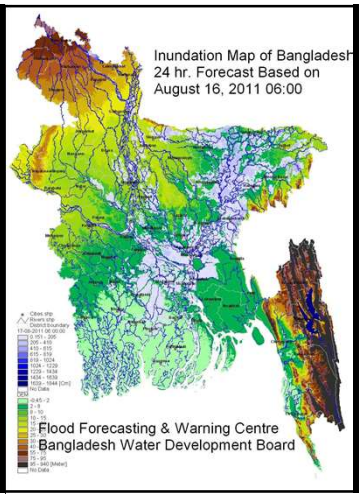



Faster Construction with Better Quality


## Very-Cheap RTK GNSS Receiver

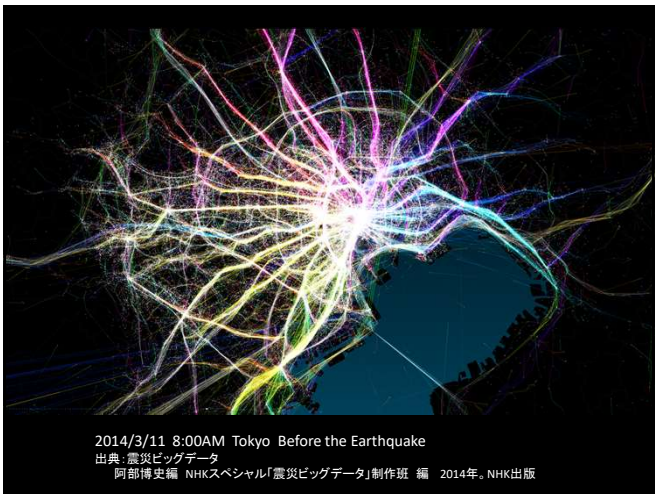
- GNSS Receiver: u-blox M8T US $80
- GNSS Antenna US $30
- RaspberryPi Computer US $50
- Battery Pack US $50
- Data Modem As per use base

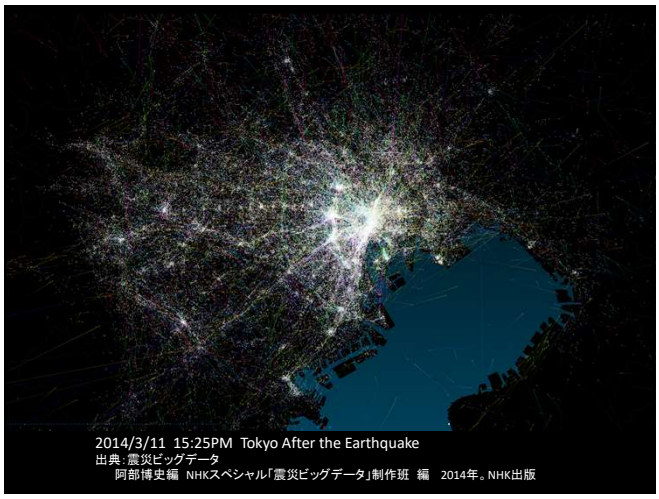
US $210

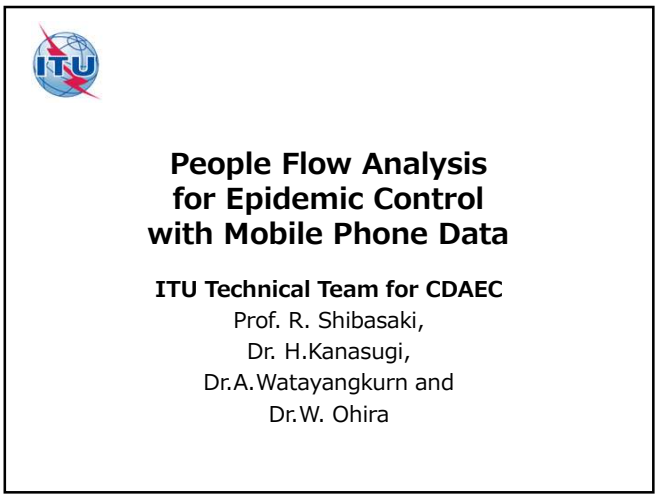


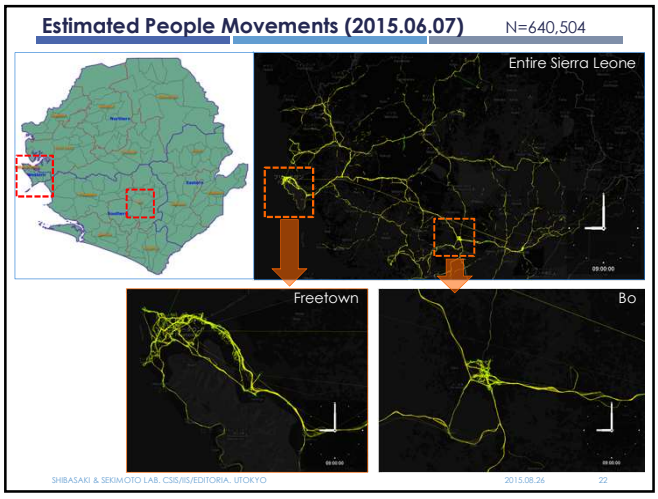

Mar.11 2011, Japan


Mar.11 2011, Japan

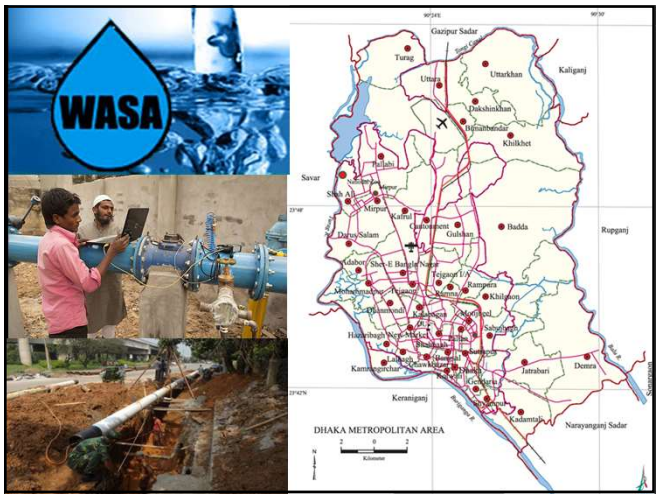

2014/3/11 8:00AM Tokyo Before the Earthquake
出典：震災ビッグデータ
阿部博史編 NHKスペシャル「震災ビッグデータ」制作班 編 2014年。NHK出版

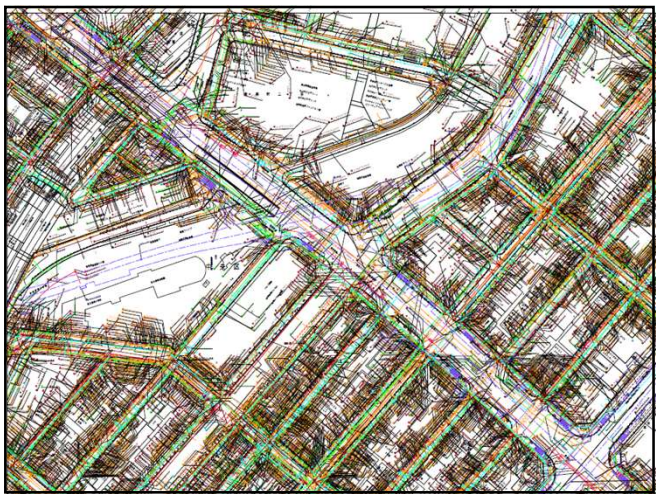

2014/3/11 15:25PM Tokyo After the Earthquake
出典：震災ビッグデータ
阿部博史編 NHKスペシャル「震災ビッグデータ」制作班 編 2014年。NHK出版

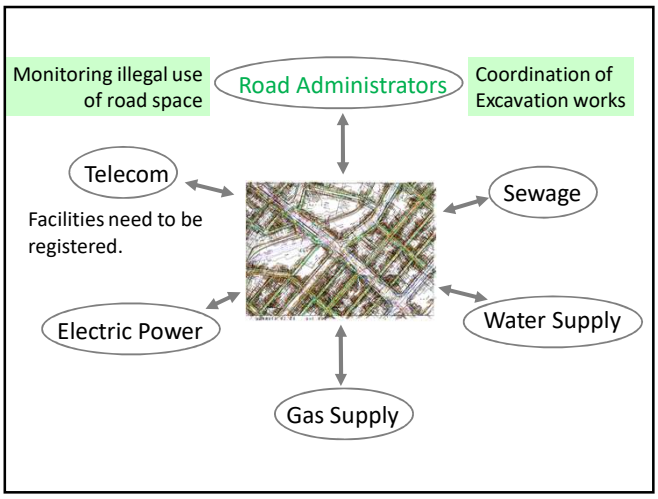

People Flow Analysis
for Epidemic Control
with Mobile Phone Data
ITU Technical Team for CDAEC
Prof. R. Shibasaki,
Dr. H.Kanasugi,
Dr.A.Watayangkurn and
Dr.W. Ohira

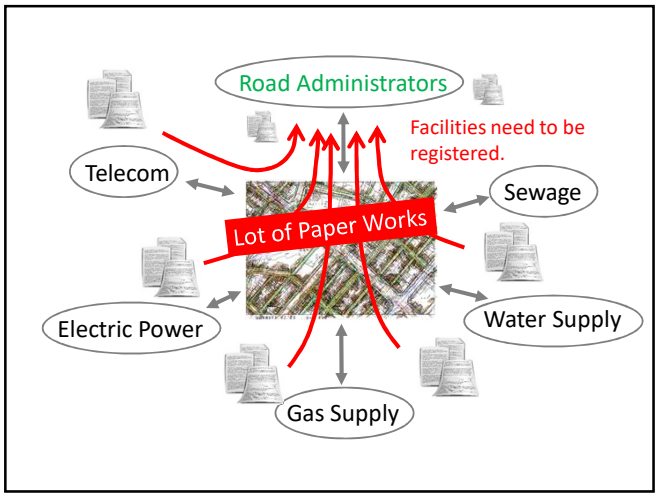

Estimated People Movements (2015.06.07)
N=640,504
Entire Sierra Leone
Freetown
Bo
SHIBASAKI & SEKIMOTO LAB. CSIS/IIS/EDITORIA, UTOKYO
2015.08.26
22

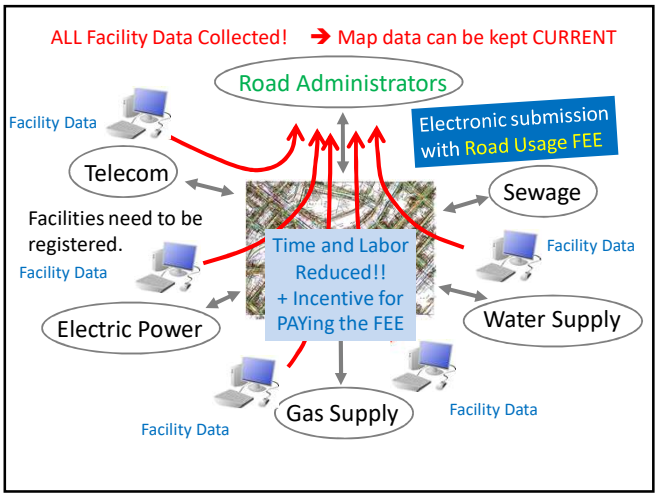

People Flow (7, June 2015) Sierra Leone
06:00:00
23

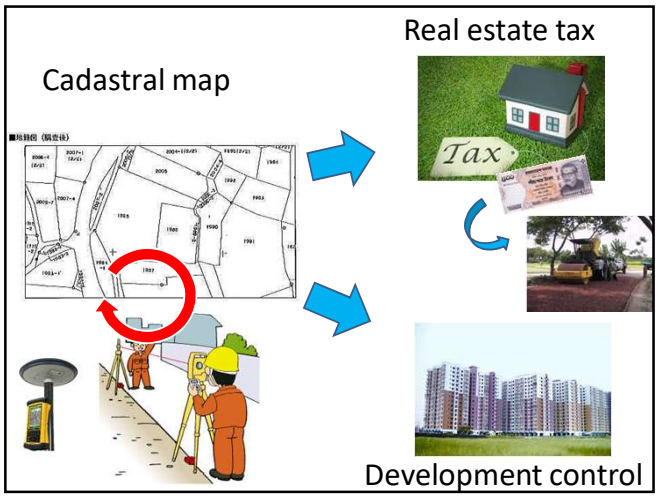

WASA
DHAKA METROPOLITAN AREA




Monitoring illegal use of road space
Road Administrators
Coordination of Excavation works
Telecom
Facilities need to be registered.
Sewage
Electric Power
Water Supply
Gas Supply


Road Administrators
Facilities need to be registered.
Telecom
Sewage
Lot of Paper Works
Electric Power
Water Supply
Gas Supply


ALL Facility Data Collected! → Map data can be kept CURRENT
Road Administrators
Facility Data
Electronic submission with Road Usage FEE
Telecom
Sewage
Facilities need to be registered.
Facility Data
Time and Labor Reduced!! + Incentive for PAYing the FEE
Facility Data
Electric Power
Water Supply
Gas Supply
Facility Data
Facility Data

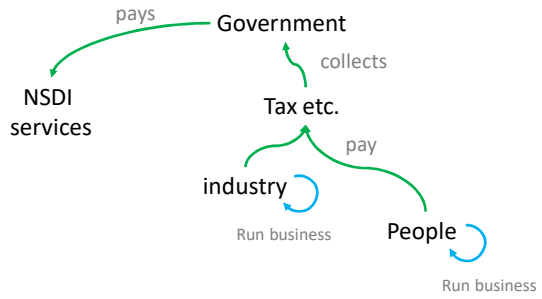



# Sustainable NSDI

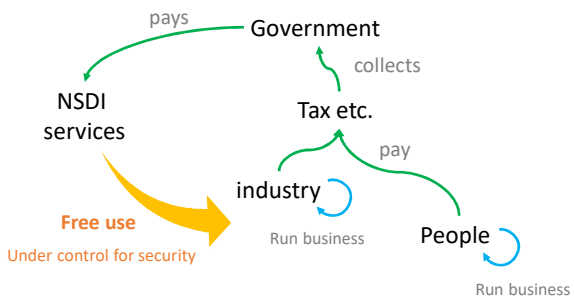
# Data Policy?

# Finance?

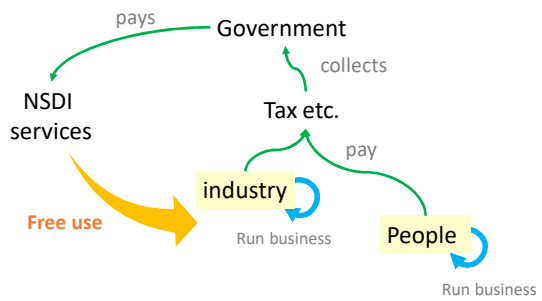
## How to finance?



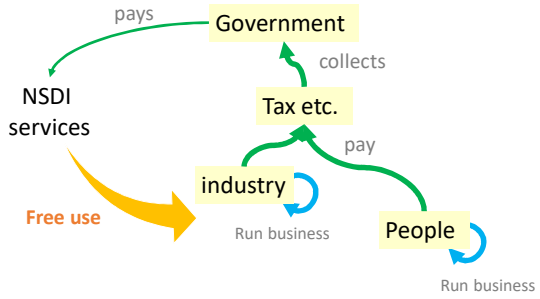

## "Free Data" policy



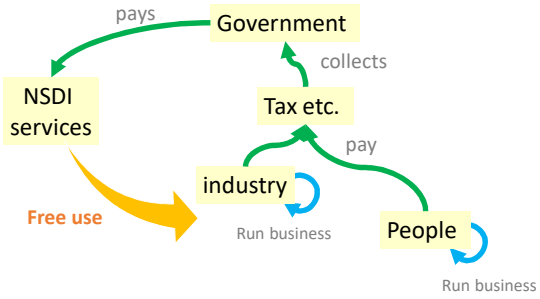

## "Free Data" policy

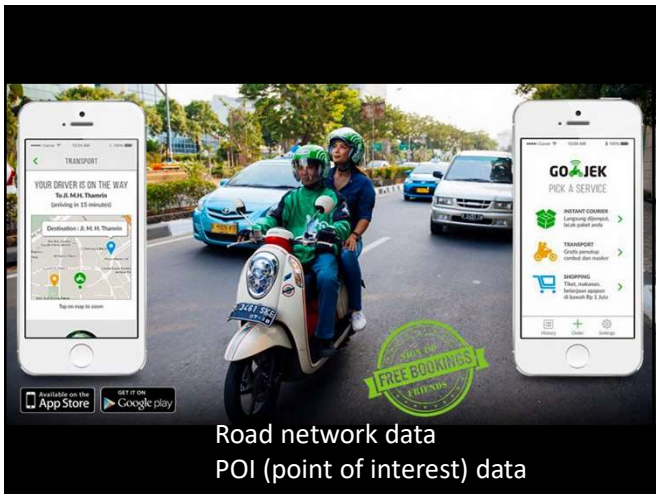


## “Free Data” policy



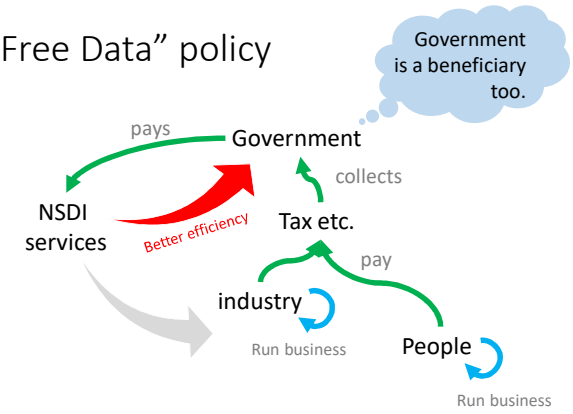

## “Free Data” policy



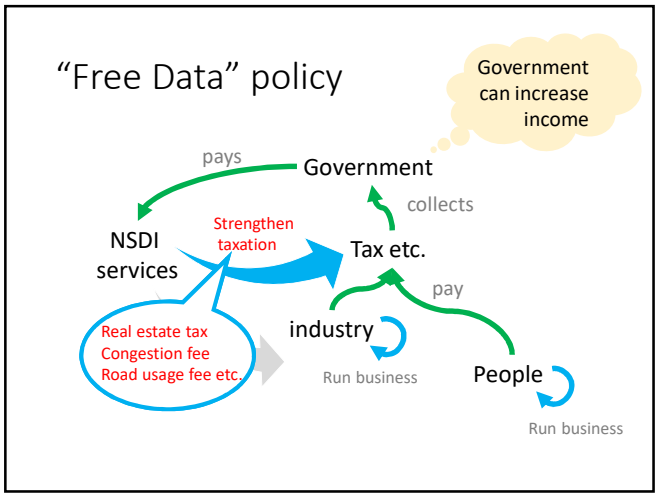




Road network data
POI (point of interest) data

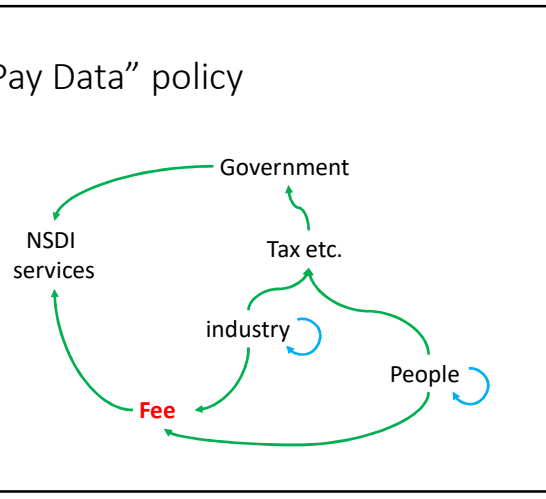
## “Free Data” policy



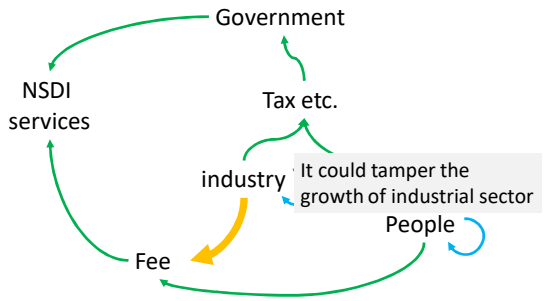

## “Free Data” policy




## “Pay Data” policy

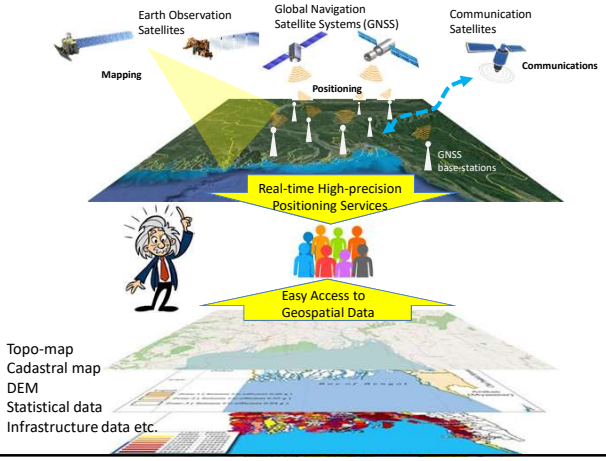


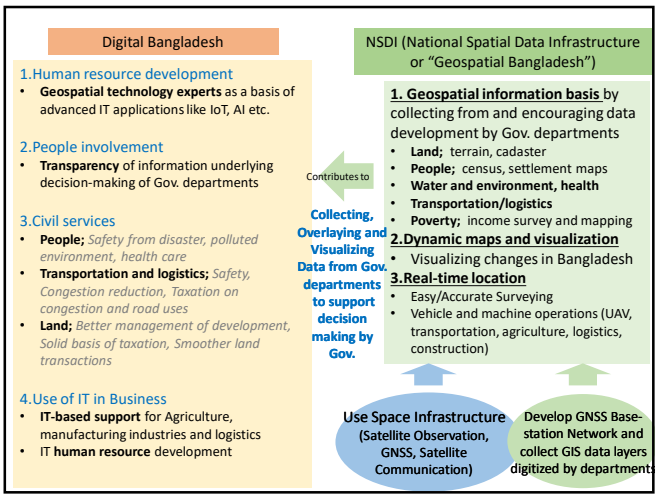
## "Pay Data" policy

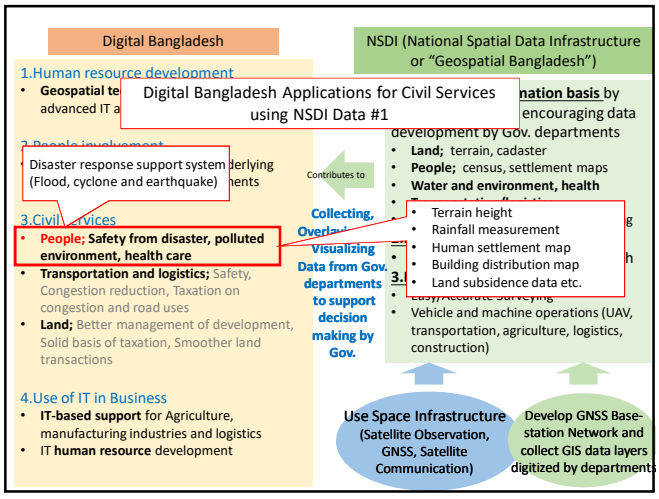


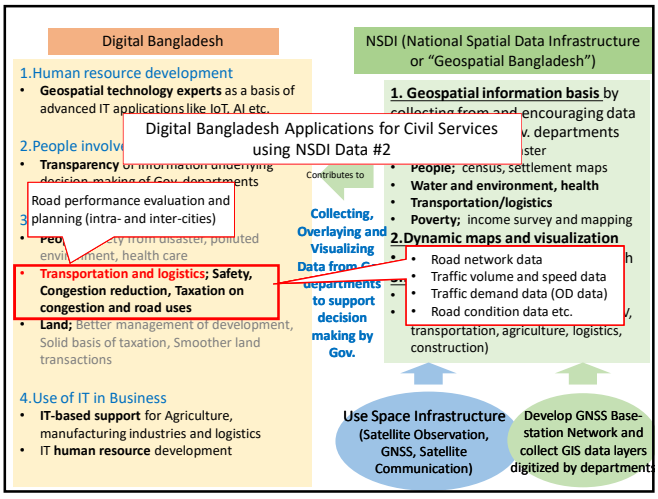

# NSDI contribute to Digital Bangladesh!

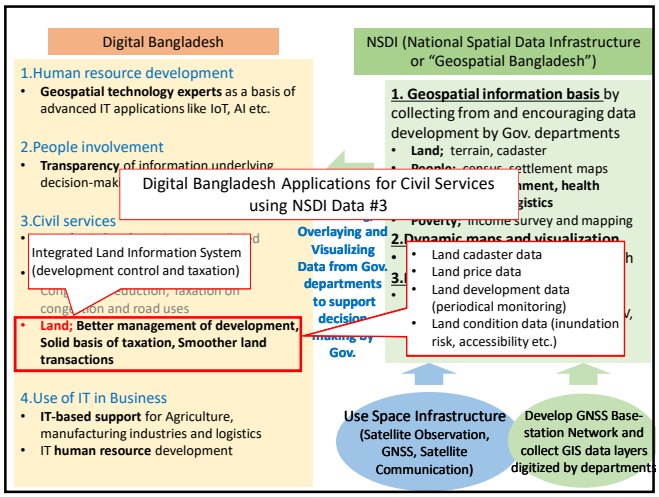
## NSDI (National Spatial Data Infrastructure)






## Concluding remarks

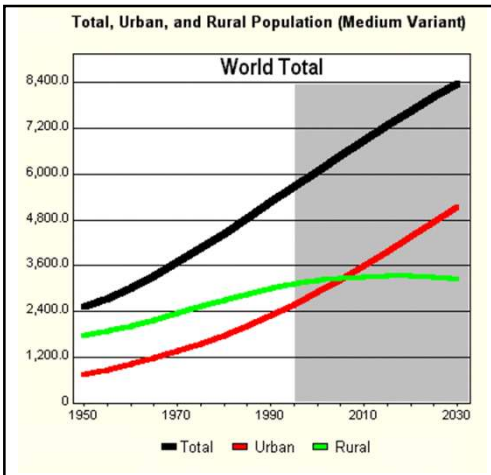
- NSDI should be a mechanism of accelerating Value Creation from Data, beyond a platform of data dissemination.
  - For social benefits, industrial development and the better welfare of People
  - Data policy and financing scheme should be designed based on the above principle.
- It is people or experts that create values from data using NSDI. University or BUET should lead Capacity Building for diverse and innovative users of NSDI.

# Needs, Demands and Value Additions of NSDI: Bangladesh Context

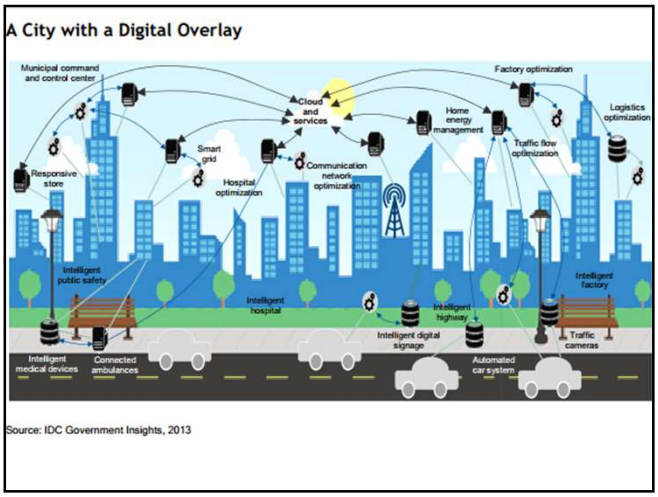
Dr. Md. Mafizur Rahman
Professor of Civil Engineering
BUET
mafizur@gmail.com

Pilot Project and System Design Concept for NSDI Construction in Bangladesh
**Hotel Pan Pacific Sonargaon, Dhaka**
**September 12 , 2017**

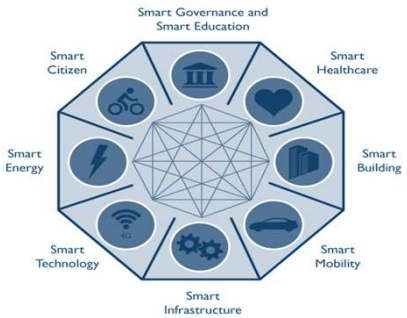
# Needs, Demands and Value Additions of NSDI: URBAN AREAS




Japan's Rollout of Smart Cities: What Role for the Citizens, The Asia-Pacific Journal, June 16, 2013 Volume 11 | Issue 24 | Number 2
Andrew DeWit




## Smart city concept




## features

- ❖Smart parking
- ❖Intelligent transport system
- ❖Tele-care
- ❖Traffic management
- ❖Smart grids
- ❖Smart urban lighting
- ❖Waste management
- ❖Smart city maintenance
- ❖Smart taxi
- ❖Digital-signage.

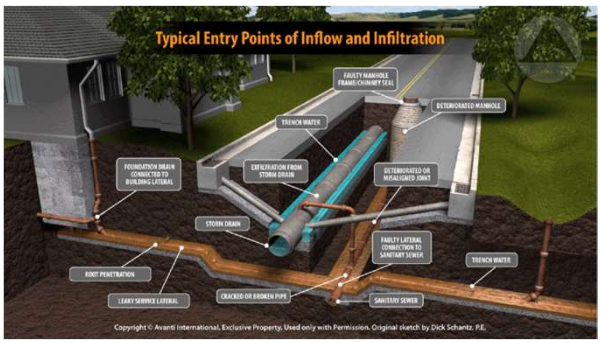
## Various Service Lines

- Water Supply
- Sewerage
- Storm Water
- Gas
- Electricity
- Internet (Fiber Optics)
- Telephone (Land phones)
- Television

:
:
:
:

Purbachol Sector 16

SERVICE LINES ARE NOT SIMPLE: Have Associated Components

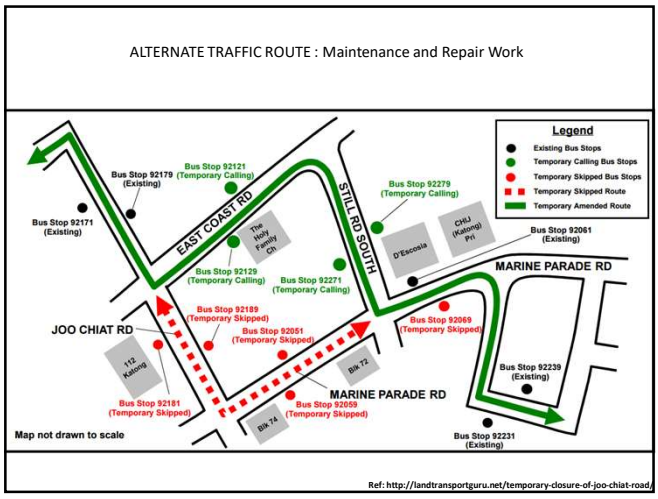


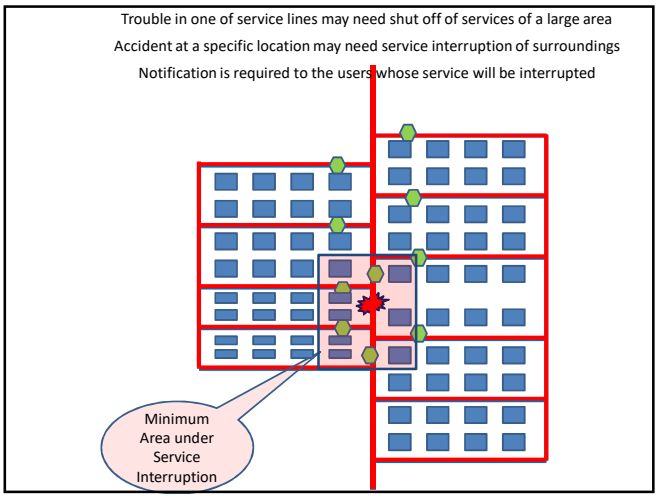

INSTALLATION OF NEW PIPE/ Maintenance of Existing Systems

http://foxbrow.com/2017/06/28/15-municipalities-to-split-nearly-14m-for-replacement-of-lead-service-lines/

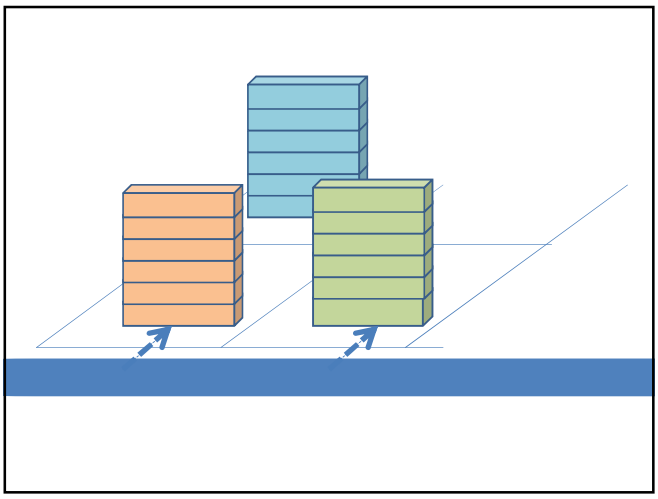
Excavation is difficult in a Densely populated City : Dhaka

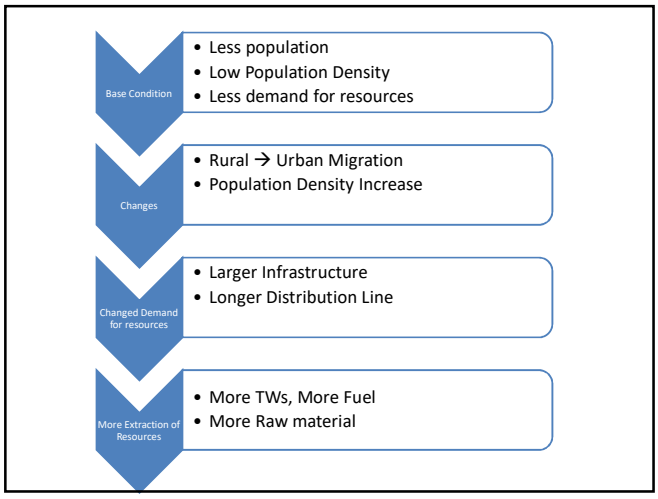
Excavation is difficult in a Densely populated City : Dhaka

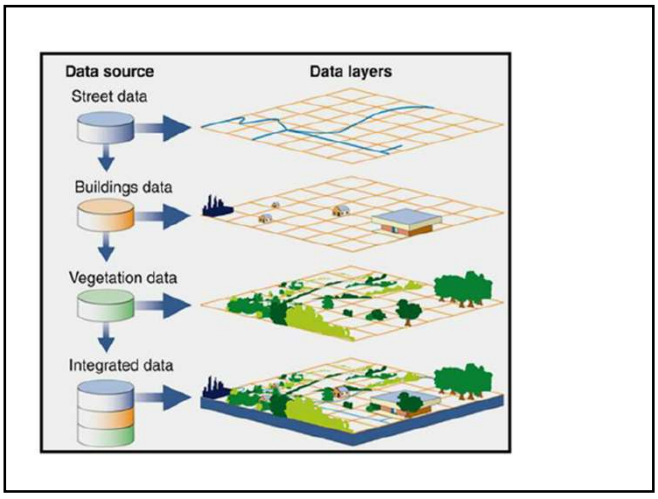

ALTERNATE TRAFFIC ROUTE : Maintenance and Repair Work
Legend
Existing Bus Stops
Temporary Calling Bus Stops
Temporary Skipped Bus Stops
Temporary Skipped Route
Temporary Amended Route
EAST COAST RD
STILL RD SOUTH
MARINE PARADE RD
JOO CHIAT RD
Bus Stop 92179 (Existing)
Bus Stop 92121 (Temporary Calling)
Bus Stop 92171 (Existing)
Bus Stop 92279 (Temporary Calling)
Bus Stop 92061 (Existing)
Bus Stop 92129 (Temporary Calling)
Bus Stop 92271 (Temporary Calling)
Bus Stop 92189 (Temporary Skipped)
Bus Stop 92051 (Temporary Skipped)
Bus Stop 92069 (Temporary Skipped)
Bus Stop 92239 (Existing)
Bus Stop 92181 (Temporary Skipped)
Bus Stop 92059 (Temporary Skipped)
Bus Stop 92231 (Existing)
Map not drawn to scale
Ref: http://landtransportguru.net/temporary-closure-of-joo-chiat-road/

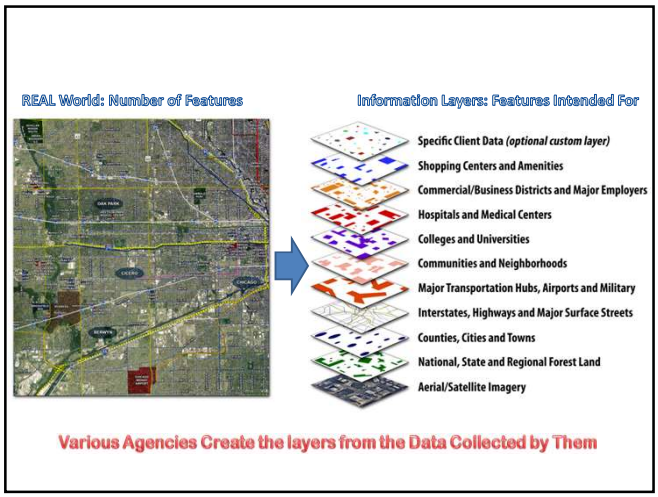

Trouble in one of service lines may need shut off of services of a large area
Accident at a specific location may need service interruption of surroundings
Notification is required to the users whose service will be interrupted
Minimum Area under Service Interruption

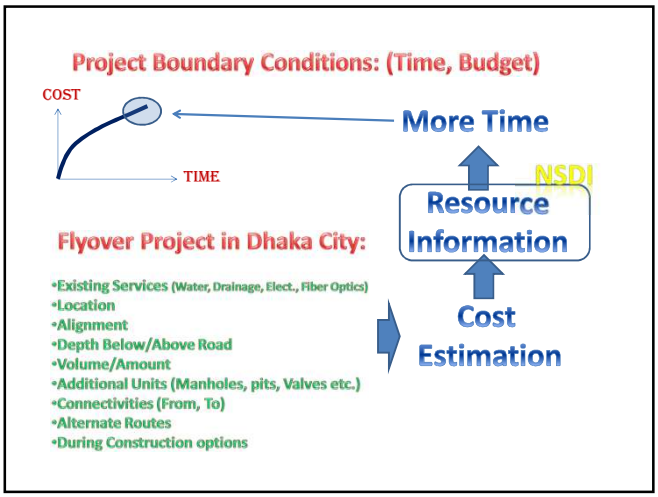

New Service Requirement
Minimum Distance Between two pipes
Width of Road is Adequate ?

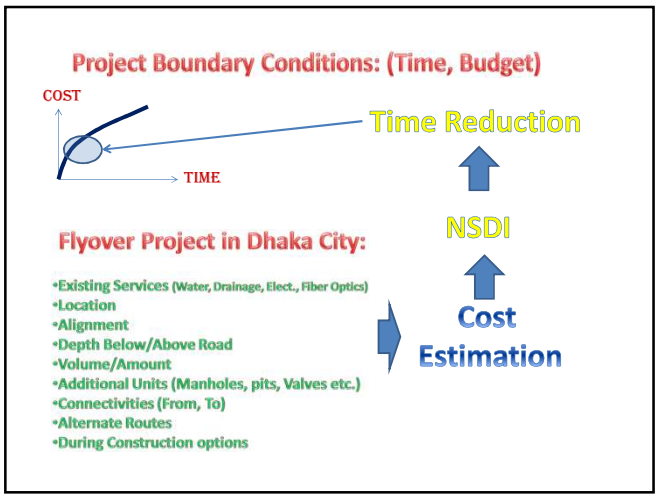


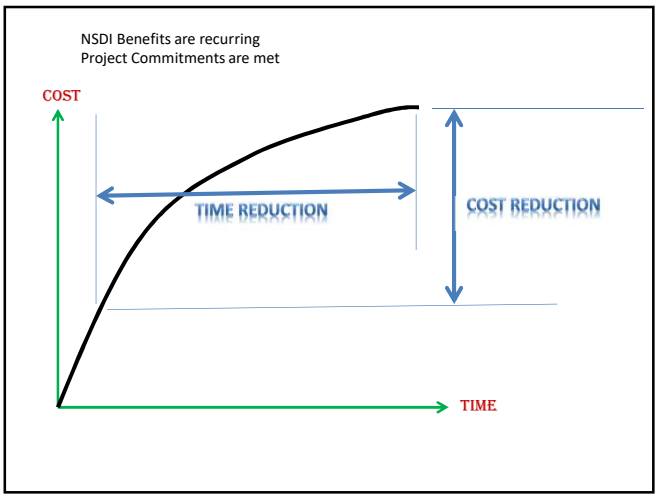

Base Condition
• Less population
• Low Population Density
• Less demand for resources
Changes
• Rural → Urban Migration
• Population Density Increase
Changed Demand for resources
• Larger Infrastructure
• Longer Distribution Line
More Extraction of Resources
• More TWs, More Fuel
• More Raw material

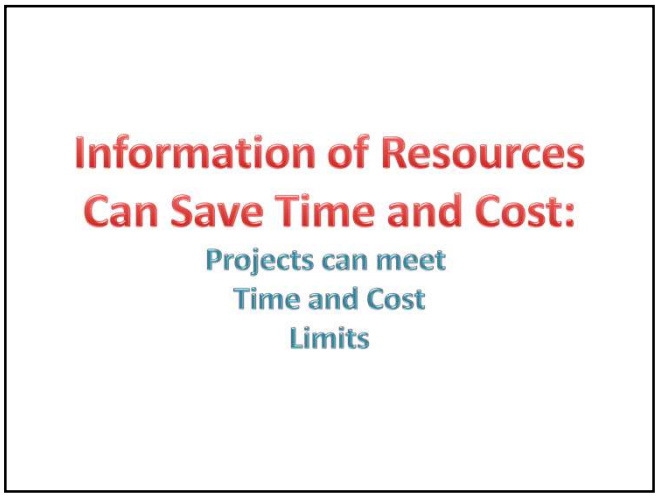

Data source
Data layers
Street data
Buildings data
Vegetation data
Integrated data

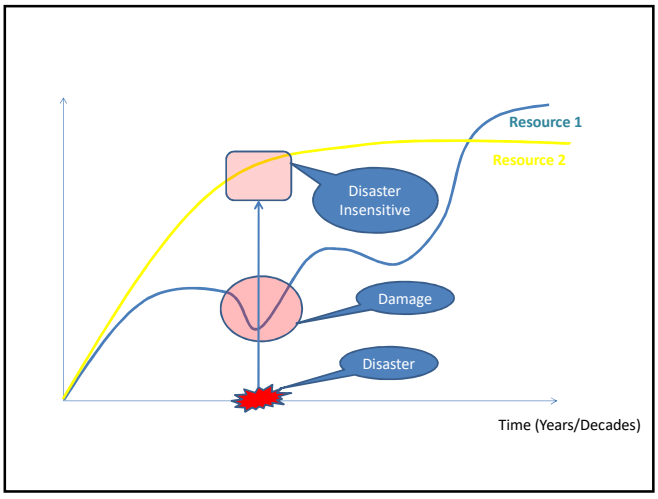

REAL World: Number of Features
Information Layers: Features Intended For
Specific Client Data (optional custom layer)
Shopping Centers and Amenities
Commercial/Business Districts and Major Employers
Hospitals and Medical Centers
Colleges and Universities
Communities and Neighborhoods
Major Transportation Hubs, Airports and Military
Interstates, Highways and Major Surface Streets
Counties, Cities and Towns
National, State and Regional Forest Land
Aerial/Satellite Imagery
Various Agencies Create the layers from the Data Collected by Them


Project Boundary Conditions: (Time, Budget)
COST
TIME
More Time
NSDI
Resource Information
Flyover Project in Dhaka City:
•Existing Services (Water, Drainage, Elect., Fiber Optics)
•Location
•Alignment
•Depth Below/Above Road
•Volume/Amount
•Additional Units (Manholes, pits, Valves etc.)
•Connectivities (From, To)
•Alternate Routes
•During Construction options
Cost Estimation

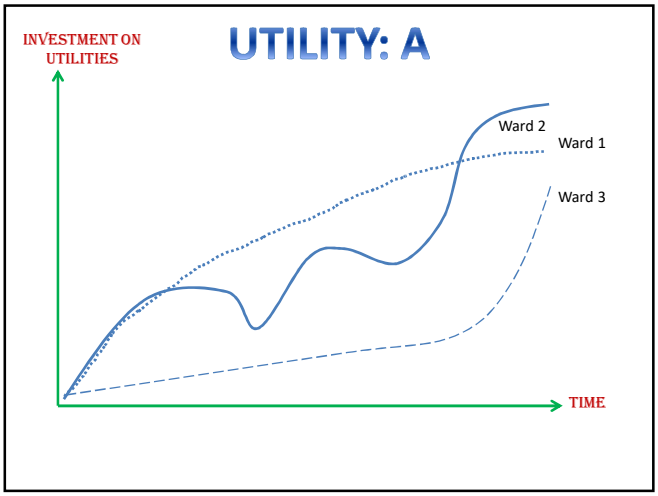

Project Boundary Conditions: (Time, Budget)
COST
TIME
Time Reduction
NSDI
Flyover Project in Dhaka City:
•Existing Services (Water, Drainage, Elect., Fiber Optics)
•Location
•Alignment
•Depth Below/Above Road
•Volume/Amount
•Additional Units (Manholes, pits, Valves etc.)
•Connectivities (From, To)
•Alternate Routes
•During Construction options
Cost Estimation

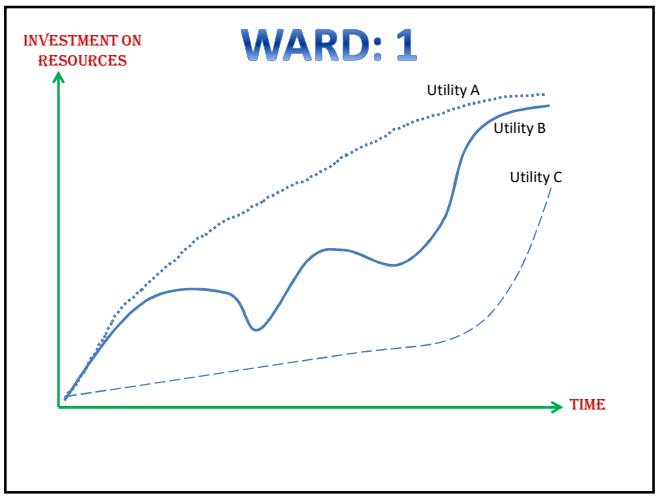

NSDI Benefits are recurring
Project Commitments are met
COST
TIME REDUCTION
COST REDUCTION
TIME


Information of Resources
Can Save Time and Cost:
Projects can meet
Time and Cost
Limits

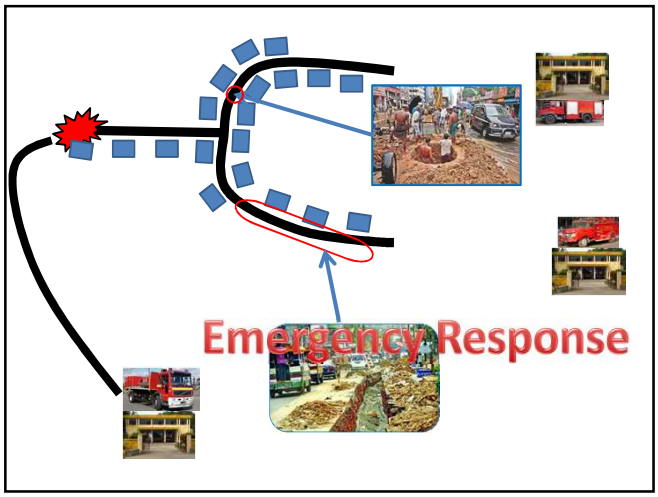

Resource 1
Resource 2
Disaster Insensitive
Damage
Disaster
Time (Years/Decades)

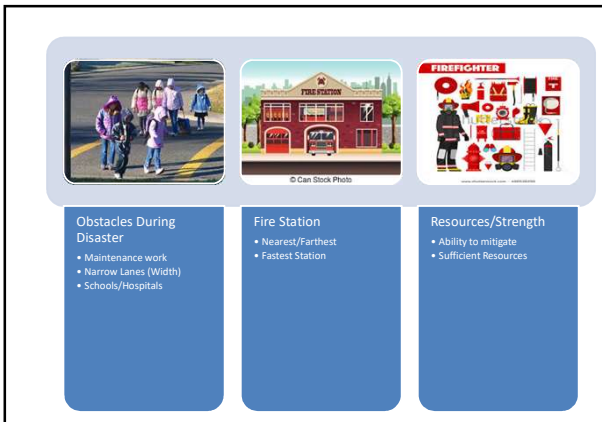
| | Resource A | Resource B | Resource C | Resource D | Resource E |
|---|---|---|---|---|---|
| LOCATION 3 | | | | | |
| LOCATION 2 | | | | | |
| LOCATION 1 | | | | | |
| Disaster 1 | S+ | S++ | S++ | IS | S+ |
| Disaster 2 | S++ | S++ | IS | S+ | S+ |
| Disaster 3 | IS | S++ | S++ | S+ | S+ |
| S: The Resource is sensitive to the Disaster, ++: The Degree of Sensitivity, IS: Disaster Insensitive Resource | | | | | |
| Disaster 5 | S+++ | S++ | S+++ | IS | IS |
| Disaster 6 | S++ | S++ | S++ | S+ | S+ |
| Disaster 7 | S++ | S++ | S++ | | |



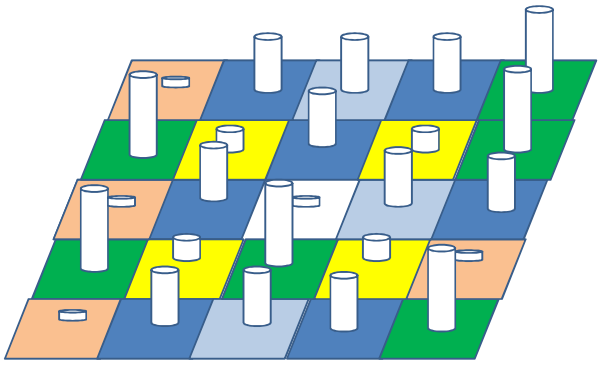

- Additional Demand for resources at the user's end
- Additional Distribution need (Infrastructure Upgradation)
- Additional Demand for resource Extraction at Source (Generating more resource)
- Time and Location (Resource Allocation)



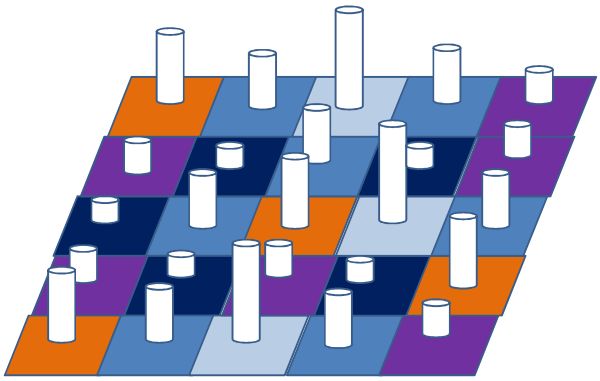



# Needs, Demands and Value Additions of NSDI: RURAL AREAS

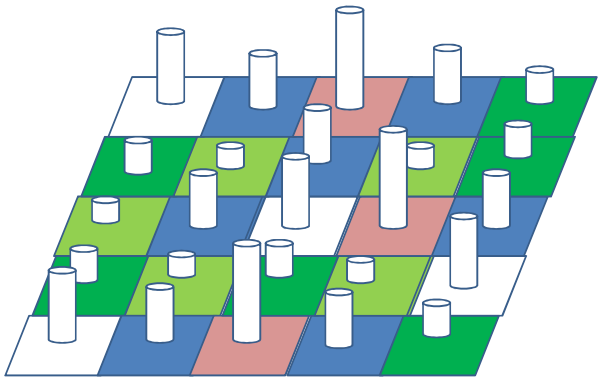
## Zone 1: Winter



## Zone 1: Summer



## Zone 1: Monsoon



## Water Management

- Crop
  - Crop Calendar
  - Zonal Crop Pattern
- Rainfall
  - Rainfall
  - Temperature
  - Climate Change
- Irrigation
  - Water Availability
  - Water Deficit

## Fertilizer Management

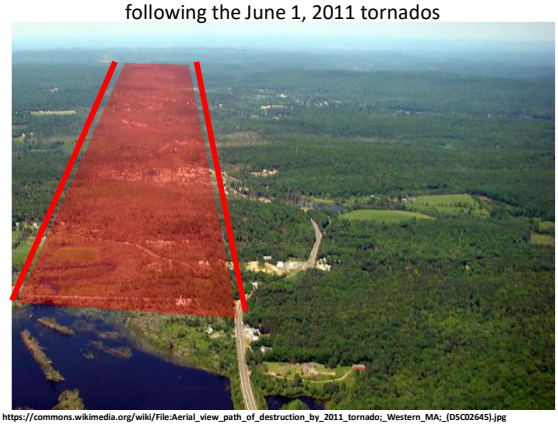
- Crop
  - Crop Calendar
  - Zonal Crop Pattern
- Soil
  - Soil Type
  - Nutrition
- Fertilizer
  - Budget
  - Availability

## NSDI

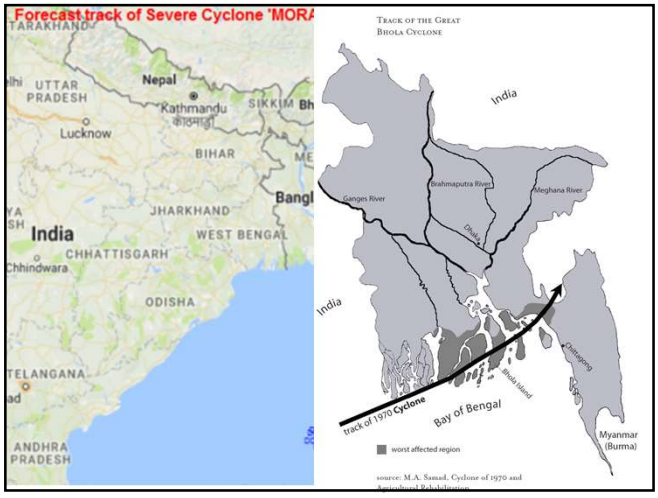
- Governance
- Agency Representation
- Information Updating
- **Accumulation of Information**
- **Coordination**
- Decision Making
- Endoresement
- Decision Making
- Dissemination
- Execution

## Disasters: Damage, Loss, Relief Operations for Disaster Recovery and Reconstruction

Aerial views of tornado damage
in Western Massachusetts
following the June 1, 2011 tornados



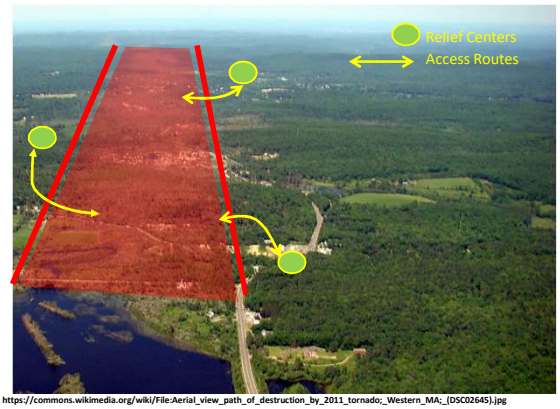
https://commons.wikimedia.org/wiki/File:Aerial_view_path_of_destruction_by_2011_tornado;_Western_MA;_(DSC02645).jpg




## Overall Summary of Damage and Losses

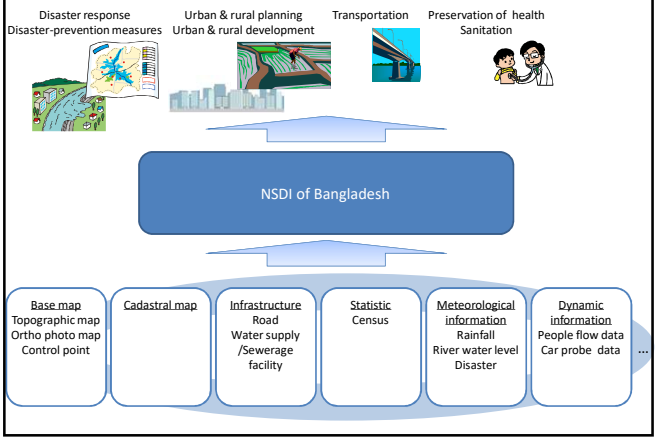
| | | Disaster Effects, million Ariary | | | Disaster Effects, USD million | | |
|---|---|---|---|---|---|---|---|
| | | Damage | Losses | Total | Damage | Losses | Total |
| **Social Sectors** | | **212,193.20** | **24,425.60** | **236,618.80** | **128.60** | **14.80** | **143.41** |
| | Education | 5,276.60 | 1,059.90 | 6,336.50 | 3.20 | 0.64 | 3.84 |
| | Health | 11,230.00 | 5,690.50 | 16,920.50 | 6.81 | 3.45 | 10.25 |
| | Nutrition | 1,314.30 | 1,575.70 | 2,890.00 | 0.80 | 0.95 | 1.75 |
| | Housing and Public Administration buildings | 194,372.30 | 16,099.50 | 210,471.80 | 117.80 | 9.76 | 127.56 |
| **Productive Sectors** | | **13,974.8** | **212,216.10** | **226,190.80** | **8.47** | **128.62** | **137.09** |
| | Agriculture, livestock and fisheries | 10,461.10 | 159,564.30 | 170,025.40 | 6.34 | 96.71 | 103.05 |
| | Industry and Commerce | 2,849.5 | 27,423.8 | 30,273.2 | 1.73 | 16.62 | 18.35 |
| | Tourism | 664.20 | 25,228.00 | 25,892.20 | 0.40 | 15.29 | 15.69 |
| **Infrastructure** | | **60,792.10** | **24,954.90** | **85,747.00** | **36.84** | **15.12** | **51.97** |
| | Electricity | 3,502.40 | 2,957.60 | 6,460.00 | 2.12 | 1.79 | 3.92 |
| | Water and Sanitation | 616.80 | 1,729.00 | 2,345.80 | 0.37 | 1.05 | 1.42 |
| | Transport | 55,383.60 | 20,083.60 | 75,467.20 | 33.57 | 12.17 | 45.74 |
| | Telecommunications | 1,289.30 | 184.70 | 1,474.00 | 0.78 | 0.11 | 0.89 |
| **Cross-Sectoral** | | **356.60** | **475.80** | **832.40** | **0.22** | **0.29** | **0.50** |
| | Environment | 356.60 | 475.80 | 832.40 | 0.22 | 0.29 | 0.50 |
| **TOTAL** | | **287,316.70** | **262,072.40** | **549,389.00** | **174.13** | **158.83** | **333.00** |

## POST DISASTER RELIEF OPERATIONS

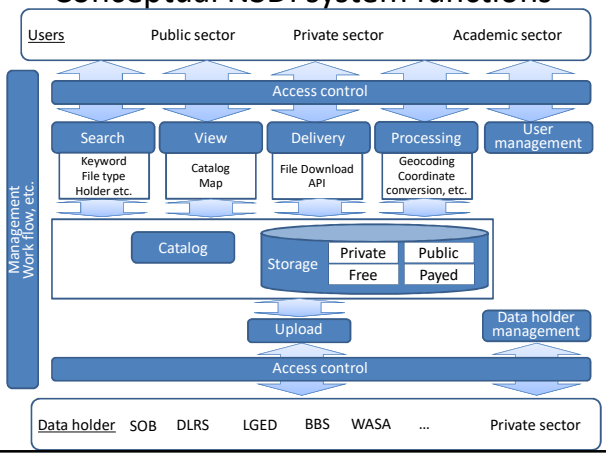



https://commons.wikimedia.org/wiki/File:Aerial_view_path_of_destruction_by_2011_tornado;_Western_MA;_(DSC02645).jpg

## Concept of NSDI in Bangladesh




## Conceptual NSDI system functions




## NSDI Challenges

**Accessibility of the data**: When any government agency or department collects data, they feel this data is their own and no one has the authority to own them. By this, they forget the benefit of giving this data as they may need some data that are collected by others instead of collecting them again.

-**Availability of digital data**: One of the bases in NSDI implementation is sharing the data and this can be difficult with non-digital data. Also, sharing has become easier with the advancement in the technology which can be done by using the internet.

- **Need of Coordination (Institutional arrangements):** Avoiding the duplication is one of the most important advantages of NSDI. And this advantage cannot be achieved with the lack of coordination and without good arrangements among agencies, particularly among agencies that receive the money from the same resource (i.e. government). The data may be collected by one of the agencies and as a result of absence of the coordination the same data collected again which duplicates the efforts and the money.

**Incompatibility of data (lack of standards):** Sharing the data is affected greatly by the lack of data sets standards. Collected data can be classified and organized in different ways, especially when using GIS databases, based on each agency needs and requirements. Hence, these data cannot be integrated in order to be shared with other agencies.

-**Lack of experts (knowledge and skills):** NSDI system design and management needs experience and knowledge in order to put the concept of the institutions structure and policy in a network and database. On other words, there is a lack of experts in GIS and IT fields.

-**Absence of technology infrastructure:** In many countries, the problem of deficiency of the technology such the high speed internet, fully constituted WAN and LAN is still present. Sharing the data is affected by this issue as agencies cannot give and take the data easily.

- **Lack of Awareness:** Many non-government agencies, public, and private sectors still have no information on GIS and SDI. These people are not cooperating due to their unawareness of the benefits of disseminating information to the public and the importance of sharing the data.

-**Funding limitation:** Many organizations suffer from the lack of funding in many spatial projects because these projects have big size data which need high processing equipment in addition to big size storage which are too expensive. Also, government agencies have some constraints in funding as they may need to show results to get the required fund. In addition, as mentioned above, the lack of organization may duplicate the money that is spent on different projects for the same area.

-- **Availability of Metadata:** The presence of metadata facilitates the ability of the users to reach its need rapidly and easily. Therefore, collection of a big size of data without metadata describe them would be like a mess. Also, the access to the required data would be time consuming if there is a probability to find these data.

-- **Need of Legal aspects:** NSDI is not only consisting of technical aspect. It is supported by policies and laws, and some of the agencies consider policies as the most important component of NSDI. Policies of many organizations are not suitable for digital data. This usually happens through the process of moving from the use of paper maps to digital data which can be transferred by the networks (internet, intranet). When policies are to manage paper maps and traditional approaches, and they are no longer can be used for digital forms. Also, another issue is the lack of the policies of the multi-field and multi-agency cooperation.

-**Difference in languages**: The provision of a platform with multilingualsupport is important and is not a trivial issue. Many nations consist of more than one language. Thus, data may be entered in a language which is different from some of the users. Therefore, there would be difficulties in searching, querying, and analysing the data.

-- **Weak Cooperation**: The main pillar of NSDI is Cooperation. The more cooperation in an NSDI initiative the more successful will be. Some of NSDI projects may implemented in a multi-stakeholder environment where the partnership has to be enough strong to push the project to the success. A number of NSDI projects experience uncooperative organizations which can affect all the aspects of an NSDI significantly.

-- **Long Term Benefits**: Some of the stakeholders resist an NSDI project in case of there is no evidence on short or medium term benefits because NSDI projects need some time in order to show result or benefits.

## NSDI advantages

Throughout the world, many NSDI initiatives have been established and many researchers have studied it from many aspects (Components, Challenges, Advantages, implementation approaches…etc.). In any of these NSDI, there are many challenges must be overcome to move on looking for the success. Therefore, the benefit of NSDI should be strong enough to motivate any government in different levels to start such project. Some of NSDI advantages have been summarized as follow(CGDI, 2003; Cetl & Tomi, 2009; Manisa & Nkwae, 2007; Martirano, Bonazountas, & Gagliardi, 2009; Shariff et al., 2011; The Land Information Council Of Jamaica, 2007):

-Guarantees the availability of the data to the users from different agencies.
-- Prevents the duplication in the spatial data by ensuring the data is collected one time.
-- Removes the redundancy of the spatial data.
-- Supports the economic development at different level: national, provincial, and local by providing platform has all needed maps by investors and private sectors, and promoting geospatial technology for tourism.
-- Links multi-government country by using inter-jurisdictional and intra-jurisdictional linkages.
-- Increases transparency of government and decision-making. - Improves the cooperation among agencies and different departments.
-- Creates and promotes the partnership between public and private sectors.
-- Enhances managing natural and land resource in addition to the actions that affect community.
-- Helps in providing the foundation in a consistent and cost-effective manner for monitoring programs (Environmental, Economic, and social changes).
-- Harmonizes numerous sizes of spatial data.

## Thanks

mafizur@gmail.com

# Project for Strengthen the Capacity on Advanced Mapping of SOB for Building Digital Bangladesh

## - Making the Roadmap to Establishing NSDI -

**Workshop**

**Roadmap for Establishment & Operation of NSDI (Draft)**

September 2017

Survey of Bangladesh (SOB)
Ministry of Defence
The Government of the People's Republic of Bangladesh

JICA Map Administration Expert
Asia Air Survey Co., Ltd.
Kokusai Kogyo Co., Ltd.
Pasco Corporation

## 1. Time Frame

An Expected Process of NSDI Establishment and Operation Plan at the dawn in Japan

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Great Hanshin & Awaji Earthquake | | Infrastructure formation phase [Establishment of a framework and rules] | | | Expansion phase [Development of the foundation] | | | Action plan to realize rich & varied life of the people using GIS [Practical dissemination] | | | |
| | | ●Development of NSDI<br>●Standardization of geospatial information<br>●Long-term planning for GIS dissemination and promotion | | | ●Development, dissemination and update of NSDI (nationwide development)<br>●Implementation of various technical assistance | | | GIS Action Program 2002-2005<br>●Promotion of efficiency of administration using GIS<br>●Support for full-scale dissemination of GIS | | | |

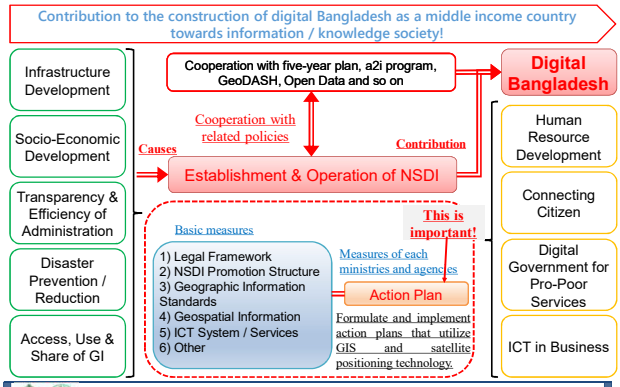
Choice, Concentration & Reduce time

**In case of Bangladesh**

| 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparation period | Infrastructure Formation / Dissemination period | | | Operation period (1) | | | | | Operation period (2) | | | | |
| Now - June 2018 | July 2018 – June 2021 (3 Years) | | | July 2021 - June 2026 (8th 5-year plan period) | | | | | July 2027 - June 2031 (9th 5-year plan period) | | | | |
| ●Basic Measures<br>●Formulation of Action Plan | | | | ●Implementation of Action Plan | | | | | ●Implementation of Action Plan | | | | |



## 2.1. Concept for Roadmap of Establishment & Operation of NSDI in Bangladesh (Tentative)






## 2.2. Basic Principles concerning Establishment & Operation of NSDI (Tentative)

Basic principles concerning basic measures and formulation and implementation of action plan of each ministry and agency are suggested as follows:

I. As basic measures for establishment and operation of NSDI, development and provide of geospatial information, promote the use of GIS and satellite positioning technology (CORS), human resource development, research & development, and strengthen cooperation among related organizations.
II. 1) Effective and efficient management of public facilities, 2) Promotion of disaster prevention / reduction measures, 3) Use, maintenance and preservation of the land, 4) Improvement of agricultural productivity, and 5) Protection of the people's lives and property, are applied GIS and satellite positioning technology.
III. Improve the efficiency, sophisticated (advanced) and transparency of administrative management of the central and local governments.
IV. Provide diverse services that contribute to the improvement of convenience for citizens regardless of difference of rich and poor, literacy abilities, place of residence in urban and rural areas.
V. Create and develop diverse businesses utilizing GIS & satellite positioning and harmonize with the environment.
VI. Pay attention to protection of personal information, promotion of secondary use of public data, and consideration of national security.

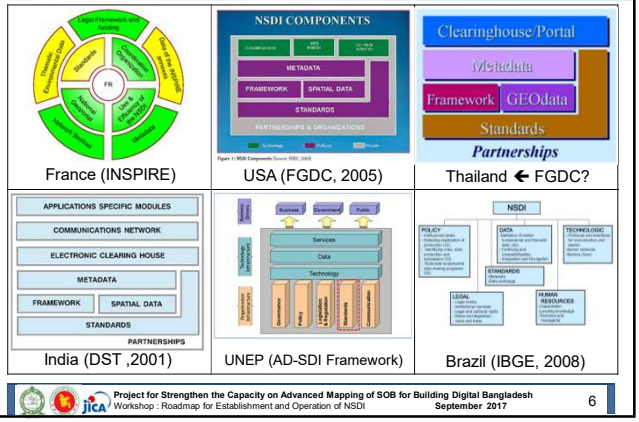


## 3. Roadmap for Establishment & Operation of NSDI

- Legal Framework
- NSDI Promotion Structure
- Geographic Information Standards (ISO/TC211)
- Geospatial Information
- IT Service / IT System
- Other
  Human Resources Development / Technology Development / Promotion / New Industry Creation



## 3.0.1 Example of Components of NSDI




France (INSPIRE) | USA (FGDC, 2005) | Thailand ← FGDC?

India (DST ,2001) | UNEP (AD-SDI Framework) | Brazil (IBGE, 2008)

## 3.1. Legal Framework

1.1 NSDI Act, new Survey & Mapping Act and their rules

1.2 Plan for Establishment & Operation of NSDI

1.3 Government Data Policy

1.4 Guidelines
(1) Personal Information
(2) Secondary Use (Copyright)
(3) National Security

1.5 Action Plan of Ministries & Agencies using GIS & PNT

1.6 Incorporation into Digital Bangladesh & 8th five-year plan



## 3.1.1 Examples of G-Spatial Action Plan in Japan (1)

Source: Cabinet Secretariat (Geospatial Information Utilization Promotion Committee)

G-Spatial Action Plan of Each Ministry for NSDI in 2015

| No. | Name of Ministry & Agency | # of Plan | Remarks |
|---|---|---|---|
| 1 | Council for promotion of geospatial information utilization | 8 | |
| 2 | Cabinet Office | 9 | Including NPA |
| 3 | Ministry of Internal Affairs and Communications | 10 | |
| 4 | Ministry of Justice | 3 | |
| 5 | Ministry of Finance | 1 | |
| 6 | Ministry of Foreign Affaires | 2 | With Cabinet Office |
| 7 | Ministry of Education, Culture, Sports, Science and Technology | 15 | |
| 8 | Ministry of Agriculture, Forestry and Fisheries | 25 | |
| 9 | Ministry of Economy, Trade and Industry | 12 | |
| 10 | Ministry of Land, Infrastructure, Transport and Tourism | **76** | **GSI: 33** |
| 11 | Ministry of the Environment | 10 | |
| 12 | Ministry of Defense | 1 | |
| 13 | National Police Agency (NPA) | 11 | |
| 14 | Other | 4 | |
| Total | | 187 | |



## 3.1.2 Examples of G-Spatial Action Plan in Japan (2)

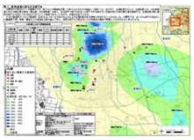
Source: Cabinet Secretariat (Geospatial Information Utilization Promotion Committee)

Promotion of the Utilization of Practical Quasi-Zenith Satellite System (GNSS)

The Emergency Call System (with Position Information) by the Japan Coast Guard

Development & Operation of the Environmental GIS

Promotion of Cadastral Survey by MLIT



Basic Research of Water

Basic Research of Land Classification (Land History)



## 3.1.3 Legal Framework of NSDI in Japan

Basic Act on the Advancement of Utilizing Geospatial Information (NSDI Act of Japan)

By the Minister of MLIT

By the National Diet

Ministerial ordinance on fundamental geospatial data (FGD)

Public Notice: Technical standards for fundamental geospatial data (FGD)

An underlying vision

Basic Plan on the Advancement of Utilizing Geospatial Information (Updated in 4 to 5 years)

*Items & Specification of FGD is defined out of NASI Act. Detailed specification of FGD is decided by GSI.*

Linkage of the Basic Act

By the Cabinet

Cooperative framework

By S/C, each ministry & agency

Guidelines for Management of Personal Information in Using Geospatial Information

Guidelines for Promotion of Secondary Use of Geospatial Information

Formulation of Action Plan

*Review and follow-up every year at the S/C*

Submission of Budget

<Budget Request Procedures>

Budget Request

The National Diet ← Cabinet ← Ministry of Finance ← Each Ministry & Agency



## 3.2. NSDI Promotion Structure

2.1 Establishment of NSDI Committee (3 levels)

2.2 Establishment of Working Group & Secretariat Office

2.3 Operation Method of NSDI Committee & WG

2.4 Enhancement for the Functions of the Secretariat

2.5 Setting & Discussing Issues

2.6 Establishment of Collaborative System among Industry (Private companies), Academia and Government



## 3.2.1 NSDI Promotion Structure in Japan

Source: Cabinet Secretariat (Geospatial Information Utilization Promotion Committee)

Council for promotion of geospatial information utilization (Bureau Director Level)

Cooperation

Academic society

Council for a partnership among industry, government and academia on geospatial information

Director meeting for the council for promotion of geospatial information utilization (Section Director Level)

W/G for Geographic Information System

W/G for Satellite Positioning

W/G for G-spatial Project Promotion

W/G for Research & Development on Common Infrastructure Technologies

W/G for G-Spatial EXPO

●S/G on Privacy Protection and Intellectual Property
●S/G on National Security
●S/G on Development and Update of Fundamental Geospatial Data

●S/G on Utilization Promotion of the G-spatial Information Center
●S/G on Advancement Promotion for the Disaster Prevention System
●S/G on IT Agriculture, Forestry and Fisheries Promotion Team
●S/G on Regional / Small & Medium Business Promotion
●S/G on Overseas Development Promotion

W/G for Infrastructure Development for Promotion of Geospatial Information Utilization in Disaster Prevention

●Task Force for Data Standardization
●Task Force for Systematization

Municipalities

Industrial Sector

Central Government

This council was decided by the Chief Cabinet Secretary.

## 3.3. Geographic Information Standards

- 3.1 Establishment of Domestic Deliberation Organization
- 3.2 Study & Research on Geographic Information Standards (ISO/TC211)
- 3.3 Standardization of Metadata
- 3.4 Standardization of Product Specification
- 3.5 Creation of Product Specifications of FGI
- 3.6 Participation in ISO / TC 211
- 3.7 Creation of Domestic Standard (Profile)
- 3.8 Dissemination of Geographic Information Standard



## 3.3.1 Significance of Standardizing Geospatial Information

Significance of Standardizing Geospatial Information

- Enhanced cross-operability of data
- Reduced cost by eliminating duplication of data
- Enhanced accuracy and promptness in data use
- Enhanced reusability of data

Conception of and Approach to Features, and Standardization of the Data

Application of Geographic Information Standards

Creation of Geospatial Information from the real world


Creation of geospatial information

Extraction

Selection of "objects" to include as geospatial information

Abstraction
Objects are presented with points, lines and surface, etc.

Complex and diverse forms in the real world can be presented in accordance with rules, allowed to freely design dataset

Features
- Structures
- Roads
- Rivers
- Bridges

Geospatial information



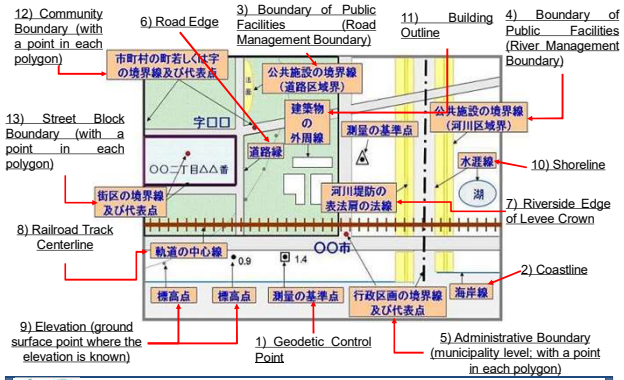
## 3.4. Geospatial Information

- 4.1 FGI (Fundamental Geospatial Information)
- 4.3 Digitization of GI
- 4.4 Digitization of AP & SI
- 4.5 Create & Update TM (1/25,000)
- 4.6 Update Dhaka TM (1/5,000 or 2,500)
- 4.7 Create & Update Urban TM (1/5,000)
- 4.2 Thematic Data
- 4.10 GI of Utility Facilities
- Grant Aid
- 4.8 CORS & Tidal Observation Station
- 4.9 RTK GNSS Survey using CORS



## 3.4.1 Fundamental Geospatial Data in Japan

Source: Geospatial Information Authority of Japan






## 3.5. IT Service / IT System

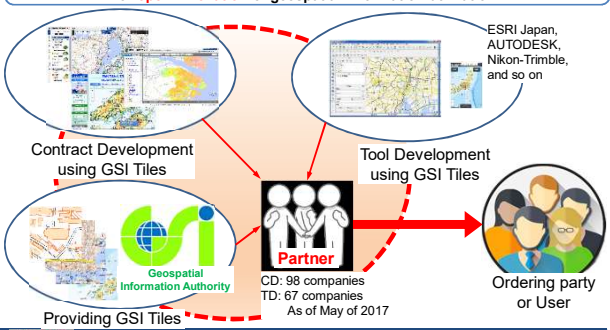
- 5.1 NSDI Platform (Including Clearinghouse Function)
- 5.2 Metadata Creation Tool
- 5.3 IT Service / System in NSDI
- 5.4 Administrative Information
- 5.5 Application Method of Utilization
- 5.6 Model System for LG
- 5.7 Software Development Capabilities with SOB & IT Co.
- 5.9 Reference Point including CORS
- 5.8 Open GIS Software
- 6.6 New Service & Industry using SOB Map



## 3.5.1 GSI Maps Partner Network

Source: Geospatial Information Authority of Japan

An external engineers (contract developers, tool providers) with the utilization power of GSI tiles are as the partner, and making information sharing and opinion exchange place **aiming for open innovation of geospatial information utilization.**



## 3.6. Other

6.1 Introduction of New Technology

6.2 Human Resource Development

6.3 Dissemination of GIS (Inc. Local Governments)

5.7 Software Development Capabilities with SOB & IT Co.

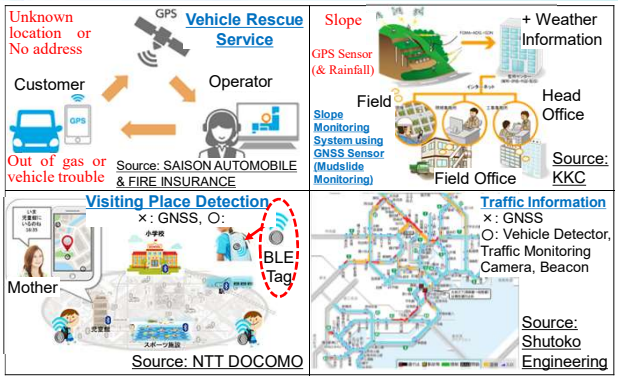
6.4 International Conference or Seminar

6.5 Domestic Seminars & Workshops on NSDI

6.6 New Services & Industries utilizing GIS & PNT



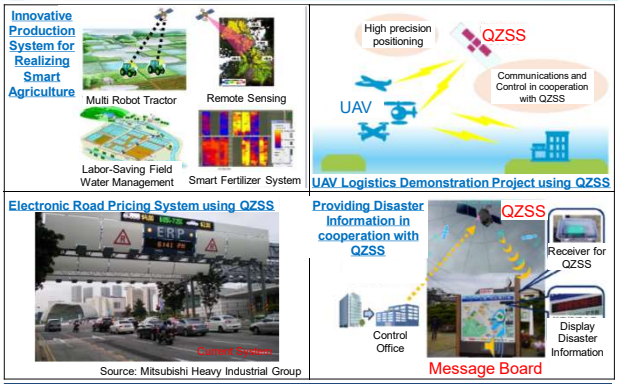
## 3.6.1 Examples of New Service & Industry in Japan






## 3.6.2 Examples of Demonstration Project in Japan

Source: Cabinet Secretariat (Geospatial Information Utilization Promotion Committee)






***Thank you very much for your attention!!***

# Project for Strengthen the Capacity on Advanced Mapping of SOB for Building Digital Bangladesh

## - Making the Roadmap to Establishing NSDI -

### Workshop

**Presentation on "Cost and Effect of NSDI in Bangladesh"**

September 2017

Survey of Bangladesh (SOB)
Ministry of Defence
The Government of the People's Republic of Bangladesh

JICA Map Administration Expert
Asia Air Survey Co., Ltd.
Kokusai Kogyo Co., Ltd.
Pasco Corporation

## 1.1 Difference of cost and effect of ordinary infrastructure development project and NSDI

- Ordinary Infrastructure Development Project (Highway, Water, Gas, Electricity, Harbor, MRT, etc.).
  - Users will pay usage fee.
  - Project earns an income.
  - An income will be used for the maintenance and operation
  - cost, updating cost and extinguishment of initial investment cost.
- NSDI
  - Basically, users will not pay usage fee.
  - Therefore, project earns no income or very small income.

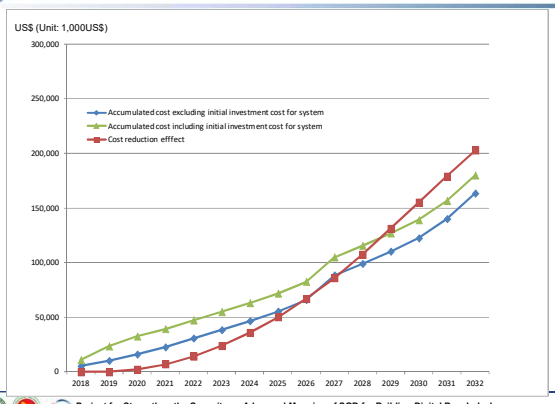


## 1.2 Cost and income of infrastructure development project

- Ordinary Infrastructure Development Project
  - Cost:
    - Initial investment cost
    - Operation and maintenance cost
    - Updating cost
  - Income:
    - Usage fee paid by users
- NSDI
  - Cost:
    - Initial investment cost for NSDI platform
    - Operation and maintenance cost
    - Updating cost of NSDI platform
    - Data preparation and updating cost
  - Income:
    - Cost reduction by the utilization of geospatial information by NSDI users.

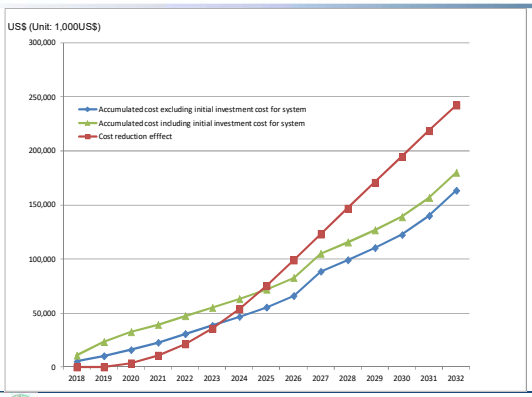


## 2.1 In case of 10% up of NSDI utilization per year



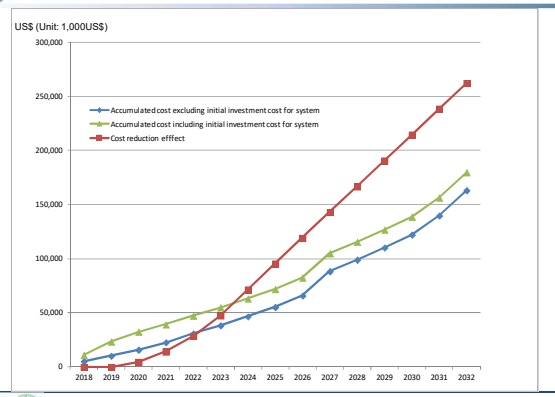



## 2.2 In case of 15% up of NSDI utilization per year






## 2.3 In case of 20% up of NSDI utilization per year



## 3. Conclusion

- From the viewpoint of cost and effect of NSDI, it is necessary to promote the utilization of NSDI, especially mutual data utilization among the organizations.
- Assuming that utilization of NSDI will increase 20% per year, it is estimated that at the end of 4th year after the construction of NSDI platform, the cost reduction effect will exceed the total cost of initial investment cost, maintenance and operation cost, platform updating cost and data preparation and updating cost.



***Thank you for your cooperation for the establishment of NSDI in Bangladesh.***

# Project for Strengthen the Capacity on Advanced Mapping of SOB for Building Digital Bangladesh

## - Making the Roadmap to Establishing NSDI -

**Workshop**

**Overview of NSDI Pilot Project**

September 2017

Survey of Bangladesh (SOB)
Ministry of Defence
The Government of the People's Republic of Bangladesh

JICA Map Administration Expert
Asia Air Survey Co., Ltd.
Kokusai Kogyo Co., Ltd.
Pasco Corporation

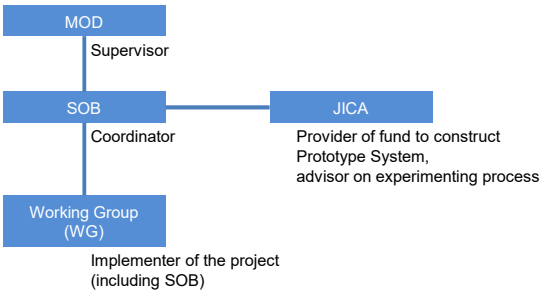
## 1.1 Objective of the NSDI pilot project

- General objective of the NSDI pilot project is followings:
  - Create a limited scale of database system (Prototype System)
  - Examine the function and performance of NSDI
  - Research on the benefits and issues prior to the introduction of full scale NSDI for Bangladesh
- Purpose and target of the NSDI pilot project
  - Suggest the best specification of NSDI for Bangladesh
  - Propose the rules of operations and roles of participated organizations



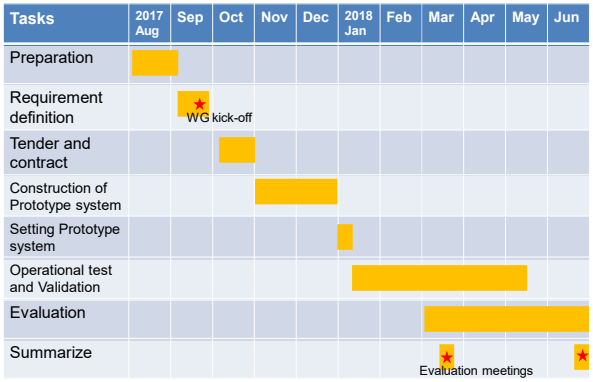
## 1.2 Project members and roles

- Organization of NSDI pilot project






## 1.3 Schedule






# 2. OVERVIEW OF THE NSDI PILOT PROJECT

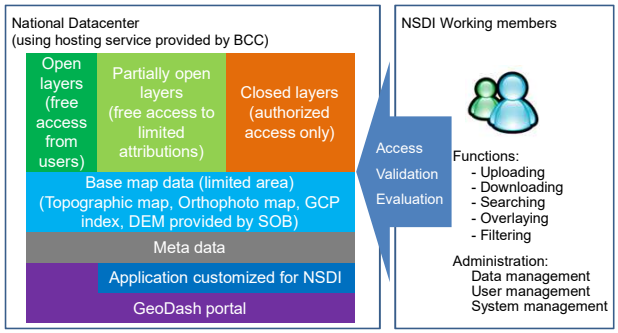


## 2.1 Structure of the NSDI prototype system (1/2)

- Basic design – NSDI powered by GeoDash
- The reasons for utilizing GeoDash are:
  - To well-designed geo-portal system established with support from WB,
  - To have operational experience to handle and publish various maps and made by public organizations,
  - To be effective in constructing NSDI prototype system.

## 2.1 Structure of the NSDI prototype system (2/2)

■ NSDI prototype system configuration






## 2.2 Experimental operation (1/2)

■ Administration process

| | |
|---|---|
| Authorization of information | Check the quality and liability of requested maps and information and permit to register. |
| Registration | Register maps and information layers according to the authorized request. |
| Access control | Set the rules of access to the registered information. |
| Unregister and update | Unregister or replace the maps and information with regulated procedures. |
| Monitoring | Monitor and summarize the accesses from clients. |



## 2.2 Experimental operation (2/2)

■ Utilizing process

| | |
|---|---|
| Checking functions | Check and examine all functions of Geo-portal. |
| Checking security control | Check security of closed and partially closed layers. |
| Using system | Check search and download operation of Clearing House. |



## 2.3 Evaluation

■ Evaluation items are as follows:

- ☐ Data Quality
  - Change of accuracy or completeness from source data
  - Workload and cost of conversion and registration
  - Consistency and integrity of different maps and information
- ☐ System performance
  - Easiness and secureness of registration
  - Sufficiency of function of geo-portal
  - System resource: capacity, speed
- ☐ Operation bodies
  - Organization of NSDI operation
  - Process of operation
  - Summarization method of user activites



## 2.4 Final reports

■ Final report include the following topics:

- ☐ Benefits and issues in utilizing NSDI on activities of public organizations
- ☐ Issues and necessity in preparation of base maps and geospatial information
- ☐ Examples of activities and organizations in which NSDI is essential or efficient
- ☐ Required specifications for full scale NSDI for Bangladesh

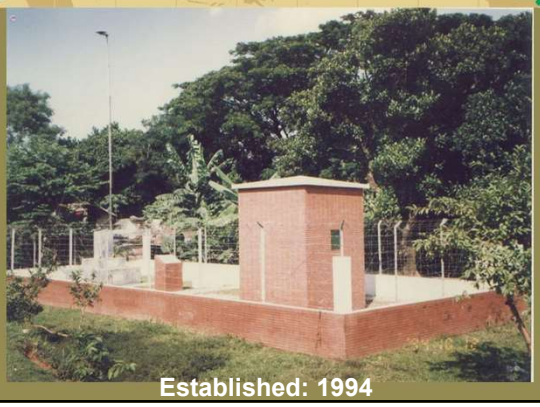
# NSDI for Bangladesh

## Geodetic Products & Services for NSDI

Nayon Chandra Sarker
Assistant Director (Survey)
Incharge, Geodetic Detachment
Survey of Bangladesh

Survey of Bangladesh establishes and maintains the Geodetic Control Network of Bangladesh

## National Datum Yard, Gulshan, Dhaka



Established: 1994

## National Horizontal Datum, Gulshan, Dhaka

## Horizontal Datum Fixation


## Horizontal Control Point Network

National Vertical Datum, Gulshan, Dhaka

Tidal Station, Rangadia, Chittagong

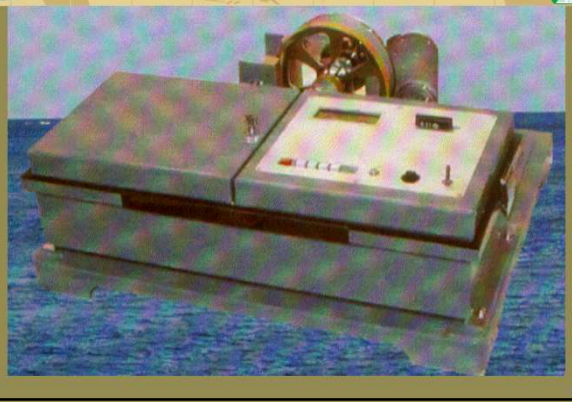

Established: 1992

Tidal Station, Rangadia, Chittagong

Tidal Bench Mark



Digital Tide Recorder



## Vertical Control Point Network


## Total number of Geodetic Survey Pillars established covering the whole country - 2495

- 1D Geodetic Survey pillars (height above MSL value only) – 1418
- 2D Geodetic Survey pillars (horizontal coordinates only) – 289
- 3D Geodetic Survey pillars (height above MSL value & horizontal coordinates) – 788

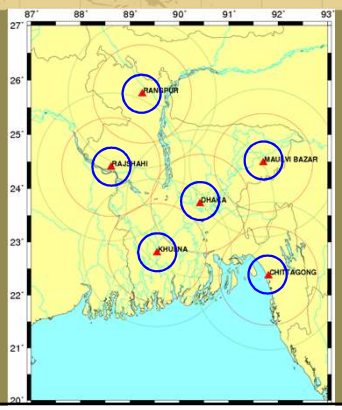
## SOB GNSS CORS


Established: 2011

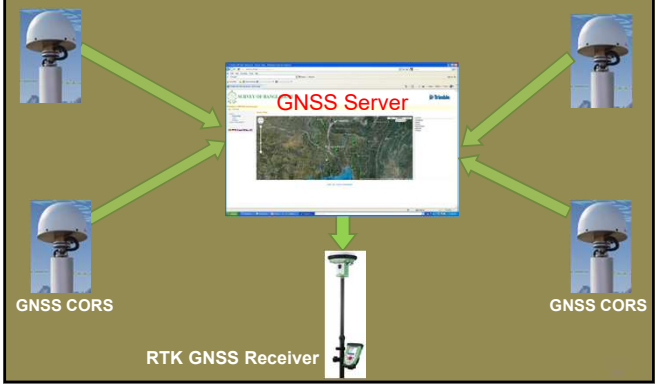

GNSS CORS (Continuously Operating Reference Station)

## IGS Stations Around Bangladesh

## Six GNSS CORS




## SOB GNSS CORS Service for RTK Survey



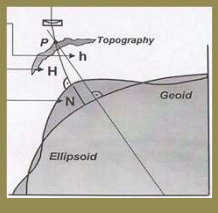

- Link for SOB Geodetic Survey Pillars → SOB → Website: www.sob.gov.bd → Important Links → SOB Geodetic Control Points
- Link for SOB GNSS CORS → SOB Website: www.sob.gov.bd → Important Links → SOB Continuously Operating Reference Station

## Next plan of SOB in the field of Geodetic Survey

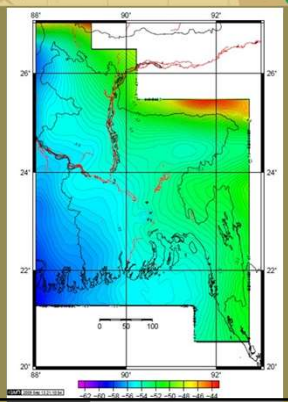
To densify the GNSS CORS Network to cover the whole country establishing additional 60 CORS with the cooperation of JICA

To prepare an accurate Geoid Model for Bangladesh

## Geoid Model of Bangladesh

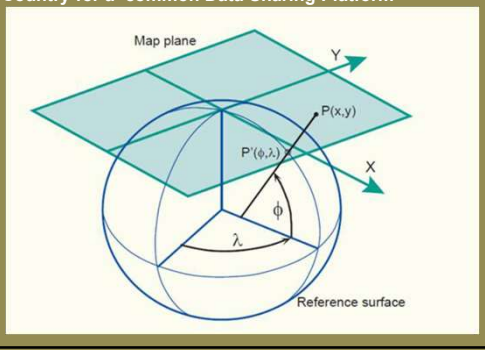



P: Point on Earth Surface
H: Elevation from MSL
h: : Elevation from Ellipsoid
N: Geoidal Seperation
H=h-N



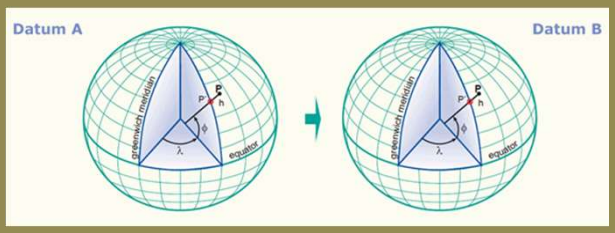
## Probable Contribution for NSDI

Defining Best Possible Geographic and Projected Coordinate System for the Country for a common Data Sharing Platform



## Probable Contribution for NSDI

Determining the Parameters for Coordinate Transformation



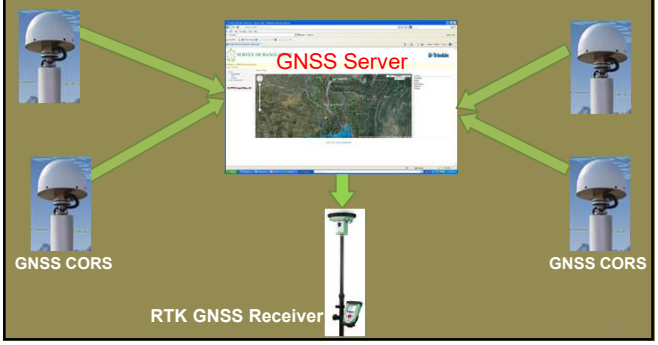

Dx = xx.xx, dy = yy.yy, dz = zz.zz

## Probable Contribution for NSDI

Determining accurate 3D Coordinate at any place

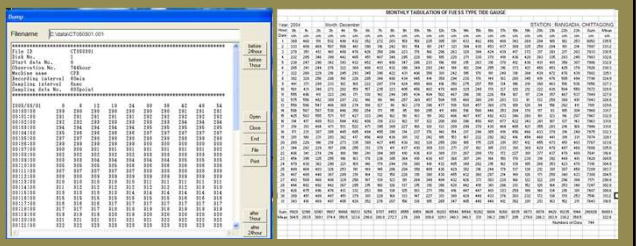
## Probable Contribution for NSDI

Providing GNSS CORS Service for RTK Survey to get quick & accurate position in Real Time



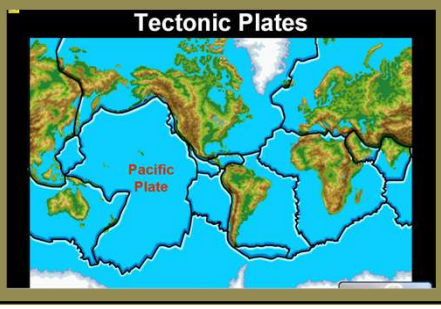

## Probable Contribution for NSDI

Providing Tidal Data for Disaster Management, Drainage System Designing, Mangrove Forest Management, Maritime and other research etc



## Probable Contribution for NSDI

Assisting Monitoring of Tectonic Plate Movement by providing GNSS CORS Data




## Probable Contribution for NSDI

Providing Coordinates & Heights of Geodetic Control Points for determining Coordinates & Heights of unknown places

Lat: 23° 52' 12.364"
Long: 90° 25' 27.421"
Height: 8.142 m

## Probable Contribution for NSDI

Assessing Spatial Standard for other Organization Data

Error Ellipse

## THANKS

## Instruments used for Geodetic Survey


GNSS CORS Receiver

## Instruments used for Geodetic Survey

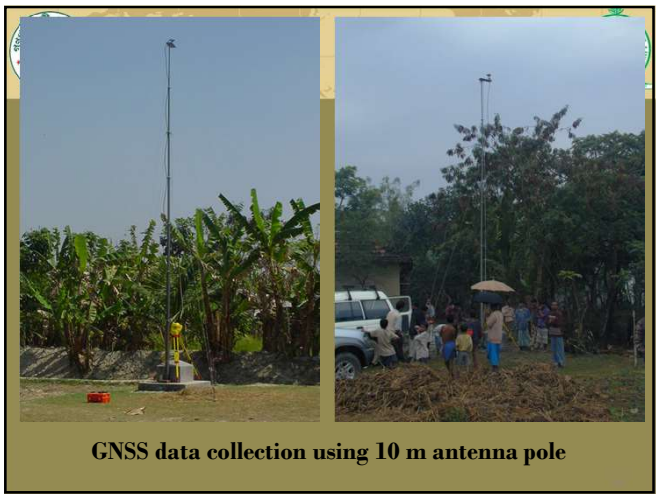
GNSS Receiver

## Instruments used for Geodetic Survey

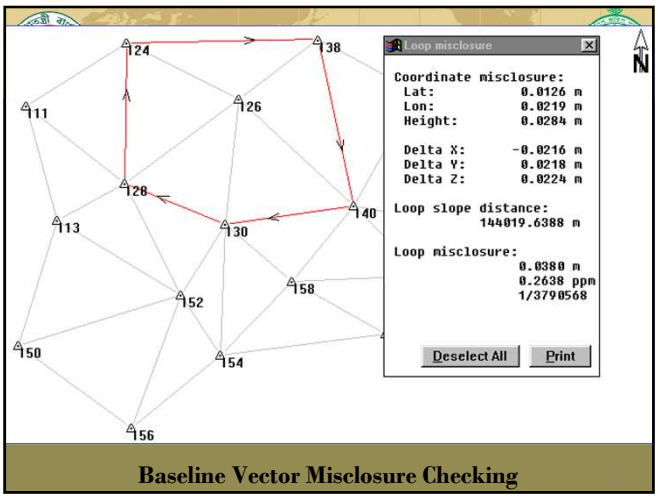
Total Station

## Instruments used for Geodetic Survey

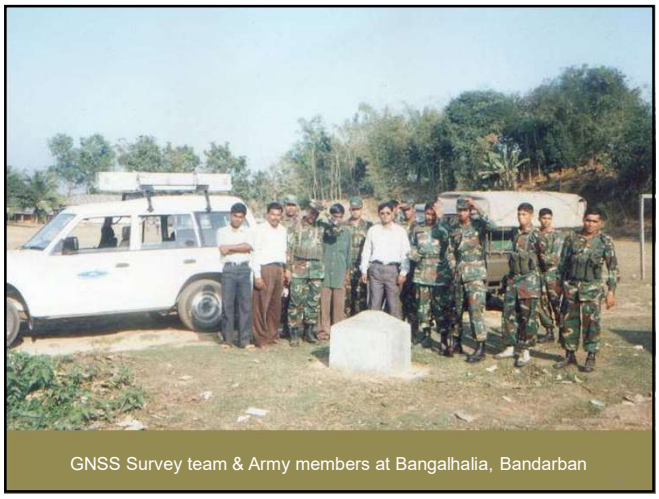
Digital Level

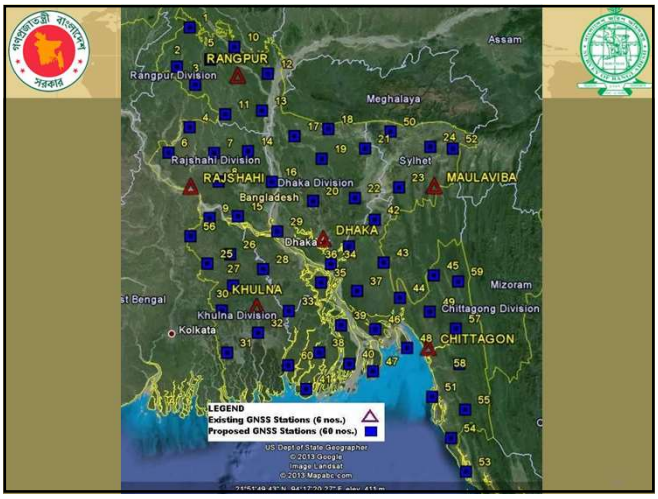
GNSS data collection using 10 m antenna pole




Baseline Vector Misclosure Checking



GNSS Survey team & Army members at Bangalhalia, Bandarban




THANKS