LARGE SCALE CADASTRAL MAPPING OF INDIA WITH SURVEY OF INDIA AS FACILITATOR, ON A PUBLIC PRIVATE PARTNERSHIP BASIS

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NAVAYUGA

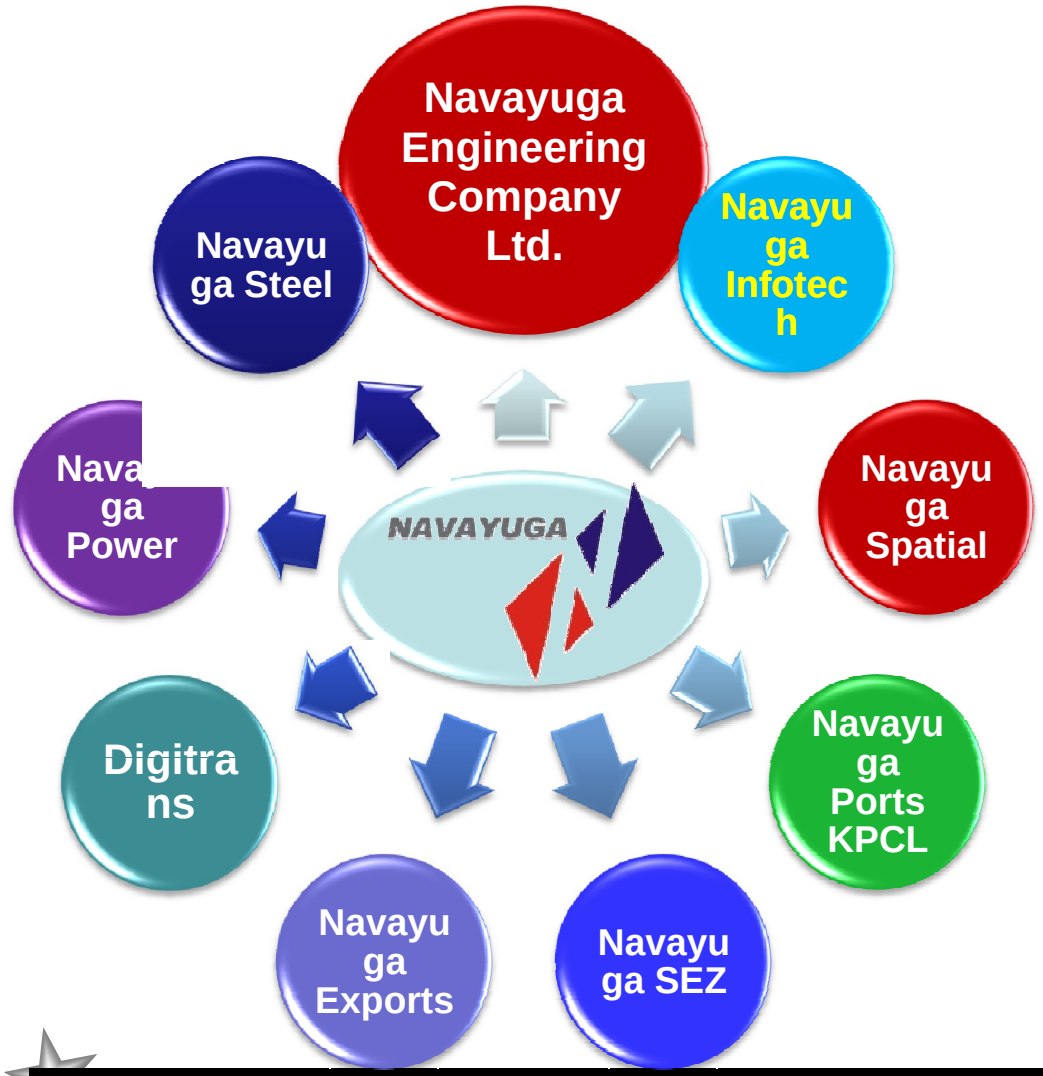
STRUCTURE OF PRESENTATION

- About Navayuga Group
- Status of mapping in the World
- Status of National Land Records Modernization Programme - India
- Cadastral Mapping of Delhi as part of DSSDI Project
- Large scale cadastral mapping of India with Survey of India as facilitator, on a PPP mode
- Conclusions

NAVAYUGA GROUP

- Founded 1986; Over 25 years of existence in India and abroad
- Revenues of $ 2 Billion and Order book of more than $ 10 Billion
- Diversified conglomerate
  - Heavy engineering
  - Ports & facilities
  - Power Projects
  - Exports
  - Navayuga Infotech
  - Navayuga Spatial Technologies (NST)
- Company with 10,000+ strong employee strength
- India's largest port comes from its stables, and its other key business interests span IT/ITES, GIS, SEZ's, Power, Steel and Exports
- The Group has been posting revenues that have been doubling year on year since 2004. But its true strengths remain an unflinching focus on quality and timely delivery..

About Navayuga



CORE COMPETENCE

Project Management

Strategic Consulting

Capacity Building

SDI Solutions

Aerial, GPS, TS, HH Survey

Navayuga Spatial Capabilities

Systems Maintenance

Remote Sensing Solutions

Positioning & Navigation Application

Photogramm etry Solutions

Web GIS Applications

Mapping & Surveying

Database Services

GIS Solutions & Services

Applications Development

Status of Mapping in the World

As of 1980 the scope of mapping also began to include cadastral mapping, as a basis for land management issues.

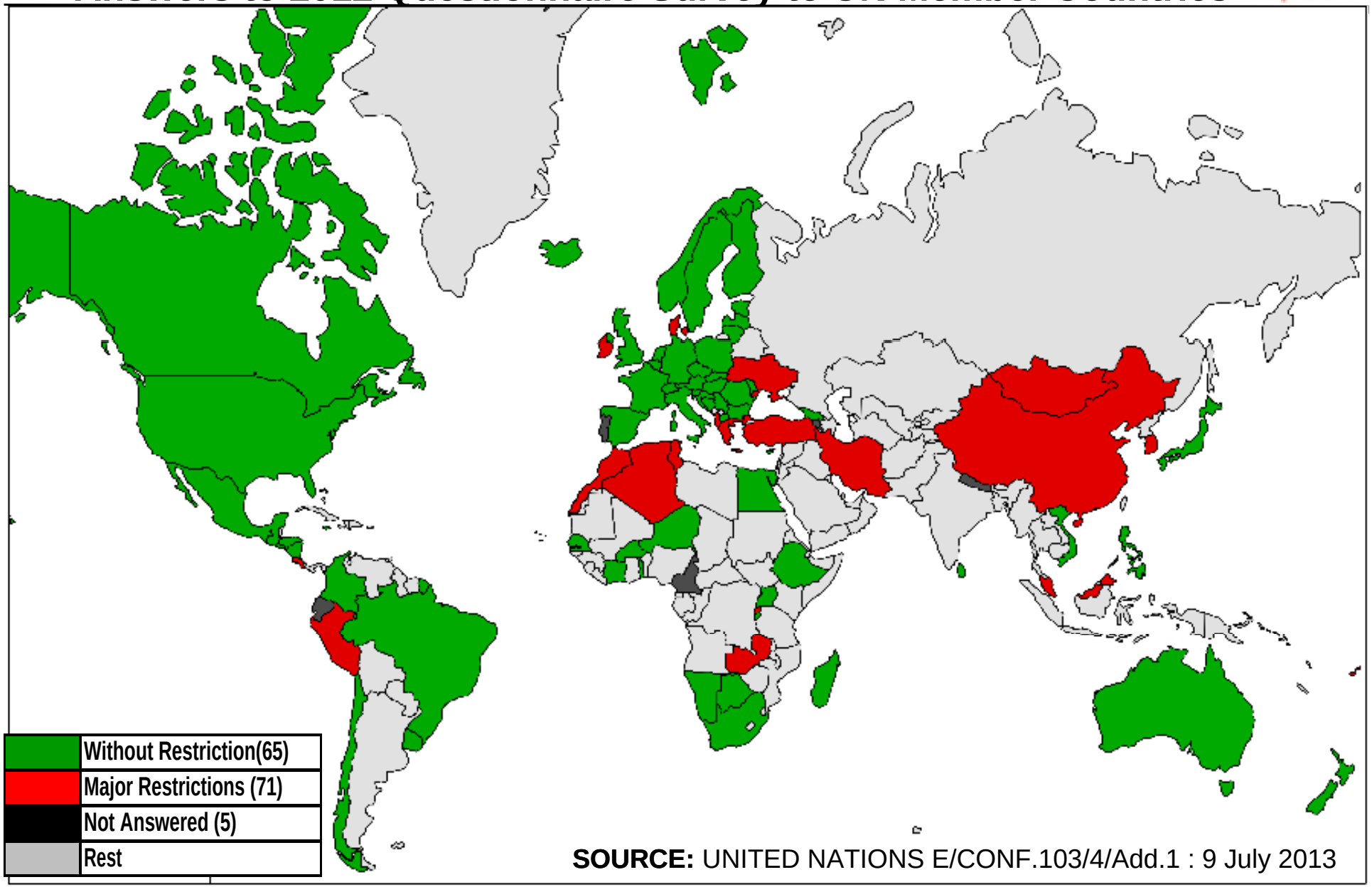
STATUS OF MAPPING IN THE WORLD

Scale/ range	1:25 000	1:50 000	1:100 000	1:200 000
Africa	2.9 %	41.4 %	21.7 %	89.1 %
Asia	15.2 %	84 %	56,4 %	100 %
Australia and Oceania	18.3 %	24.3 %	54.4 %	100 %
Europe	**86.9 %**	**96,2 %**	**87,5 %**	**90,9 %**
Former USSR	**100 %**	**100 %**	**100 %**	**100 %**
North America	54.1 %	**77.7 %**	37.3 %	99.2 %
South America	7 %	33 %	57.9 %	84.4 %
World	33.5 %	65.6 %	55.7 %	95.1 %

SOURCE: UNITED NATIONS E/CONF.103/4/Add.1 : 9 July 2013

PUBLIC AVAILABILITY OF MAPS

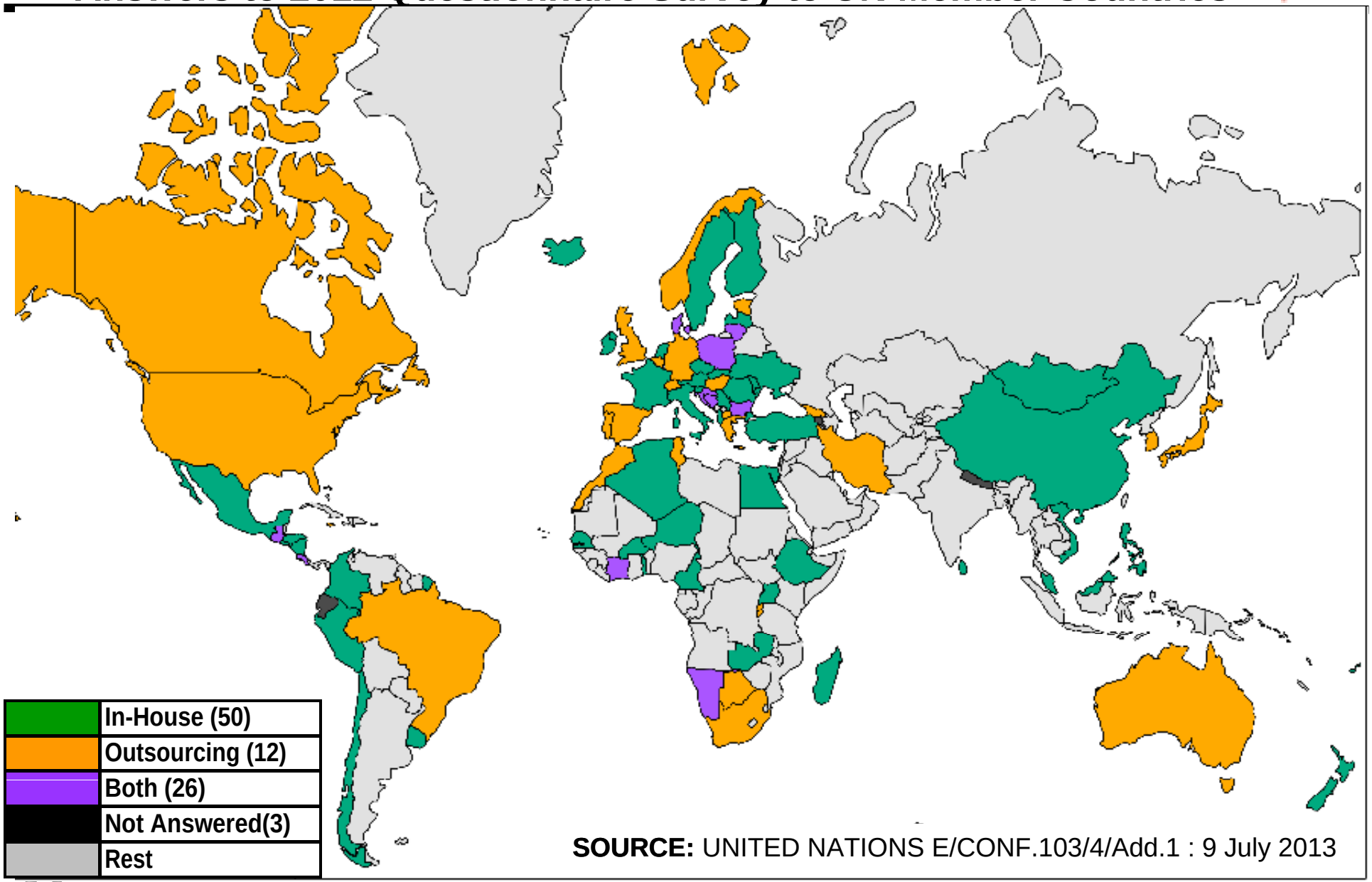
Answers to 2012 Questionnaire Survey to UN Member Countries



SOURCE: UNITED NATIONS E/CONF.103/4/Add.1 : 9 July 2013

Use of in-house facilities/outsourcing by NMAs

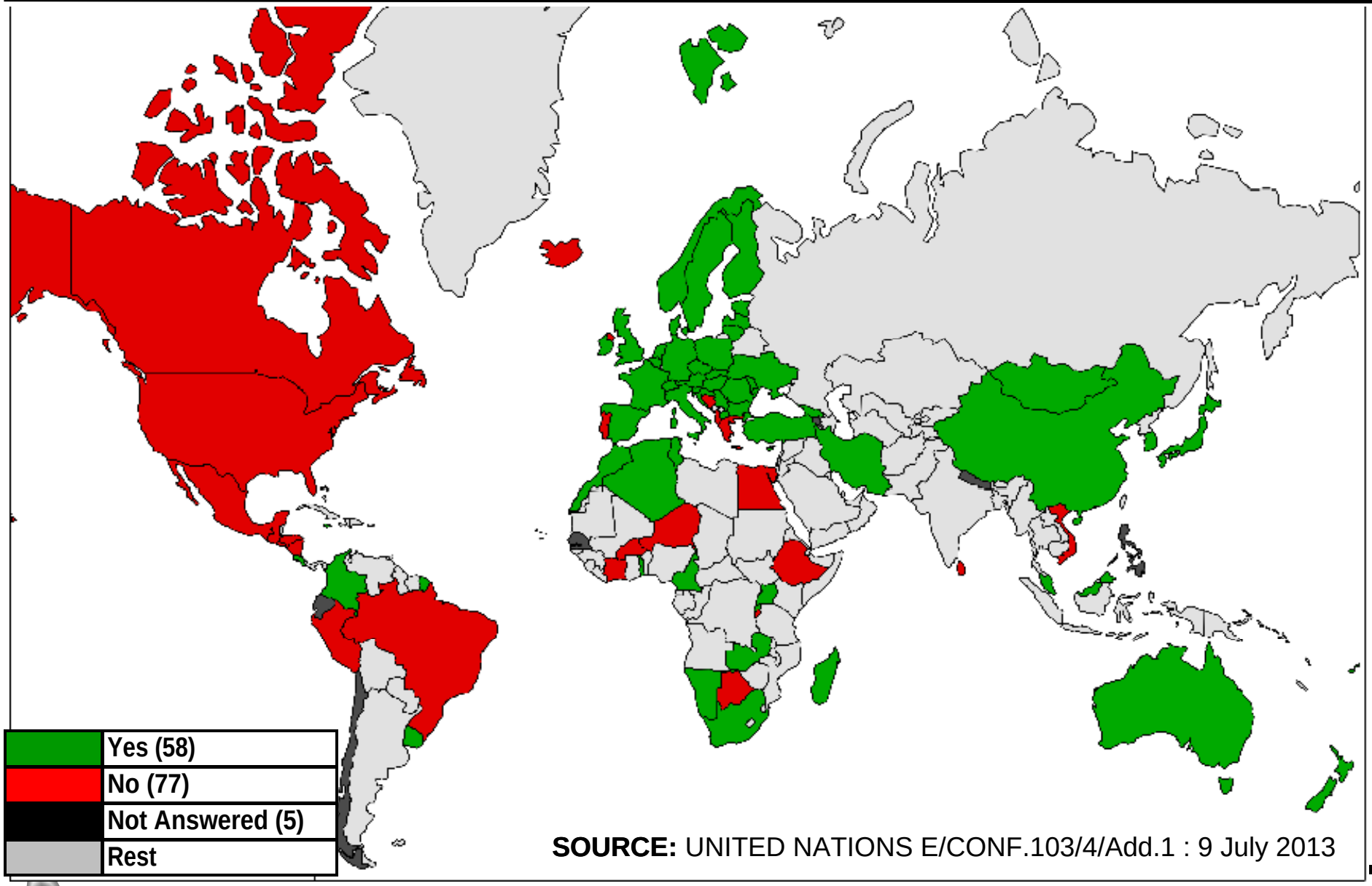
Answers to 2012 Questionnaire Survey to UN Member Countries



SOURCE: UNITED NATIONS E/CONF.103/4/Add.1 : 9 July 2013

NATIONAL CADASTRAL COVERAGE FOR THE COUNTRY

Answers to 2012 Questionnaire Survey to UN Member Countries

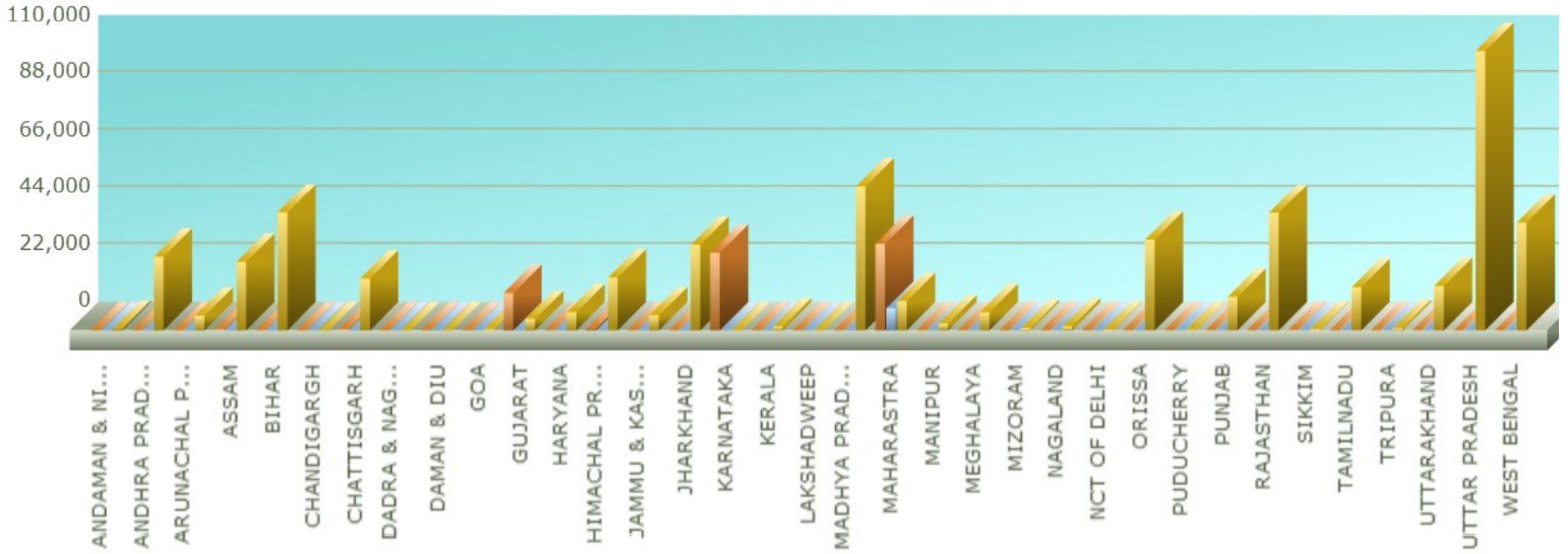


SOURCE: UNITED NATIONS E/CONF.103/4/Add.1 : 9 July 2013

Status of National Land Records Modernization Programme - India

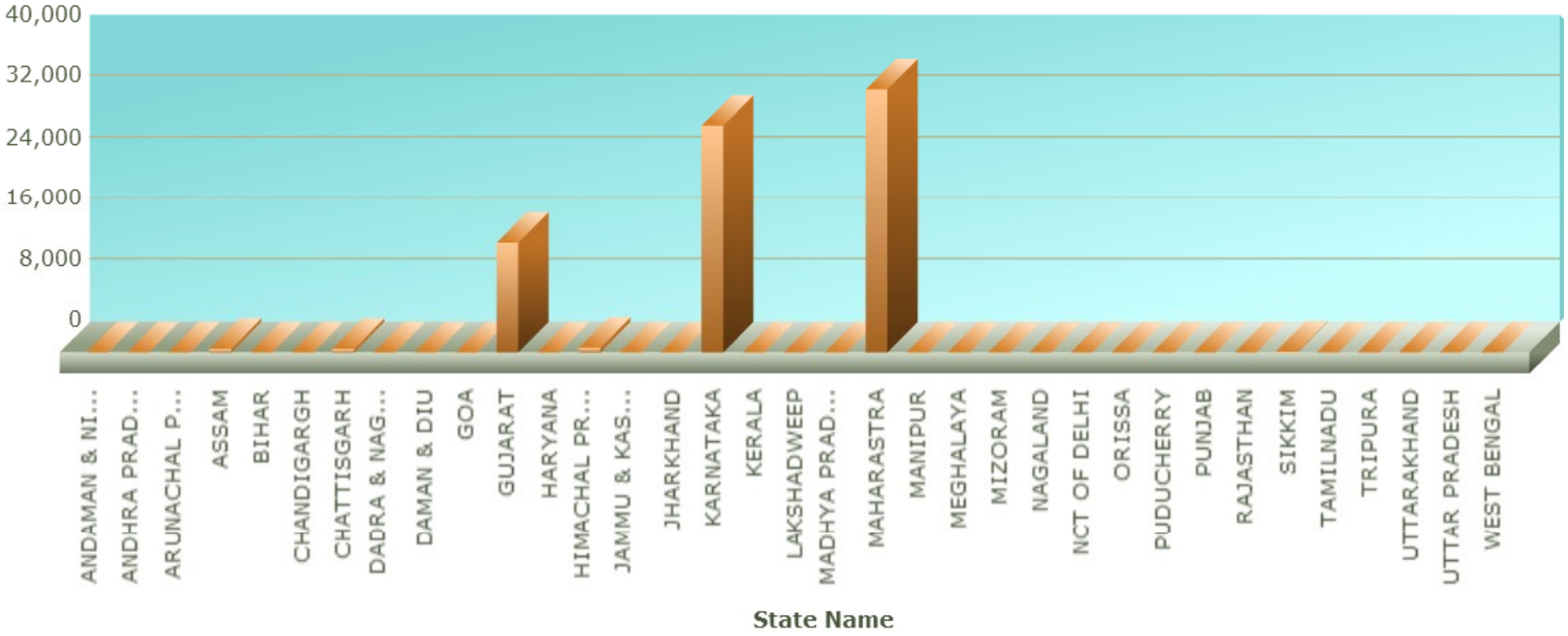
SOURCE: Department of Land Resources,
Ministry of Rural Development, Government of India
http://nlrmp.nic.in/faces/common/home.xhtml

Current Status Data Entry (No.Villages)



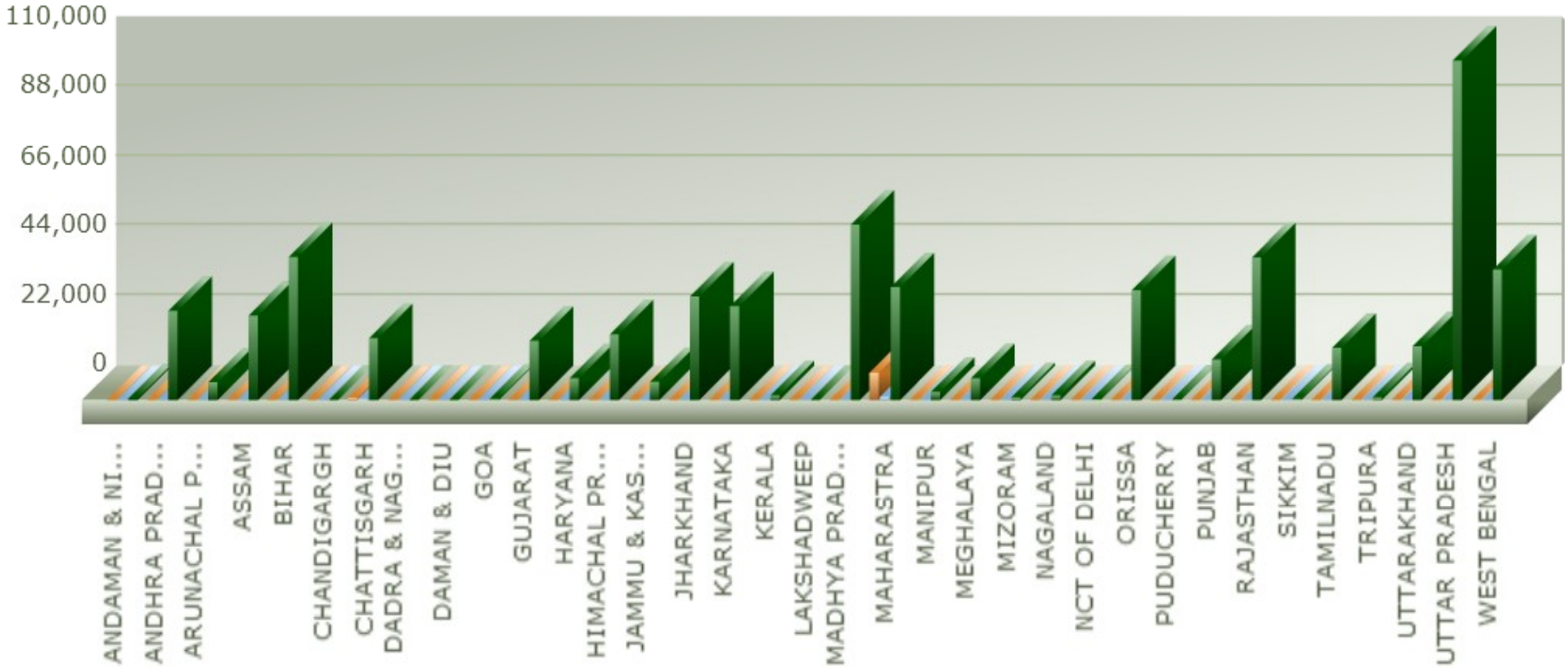
Source : Ministry of Rural Dev., GoI

Computerized Mutation (No. of Villages)



Source : Ministry of Rural Dev., GoI

Cadastral Map Digitization (Nos. of Villages)



Source : Ministry of Rural Dev., GoI

Creating single mosaic of Delhi Cadastre, DSSDI Project

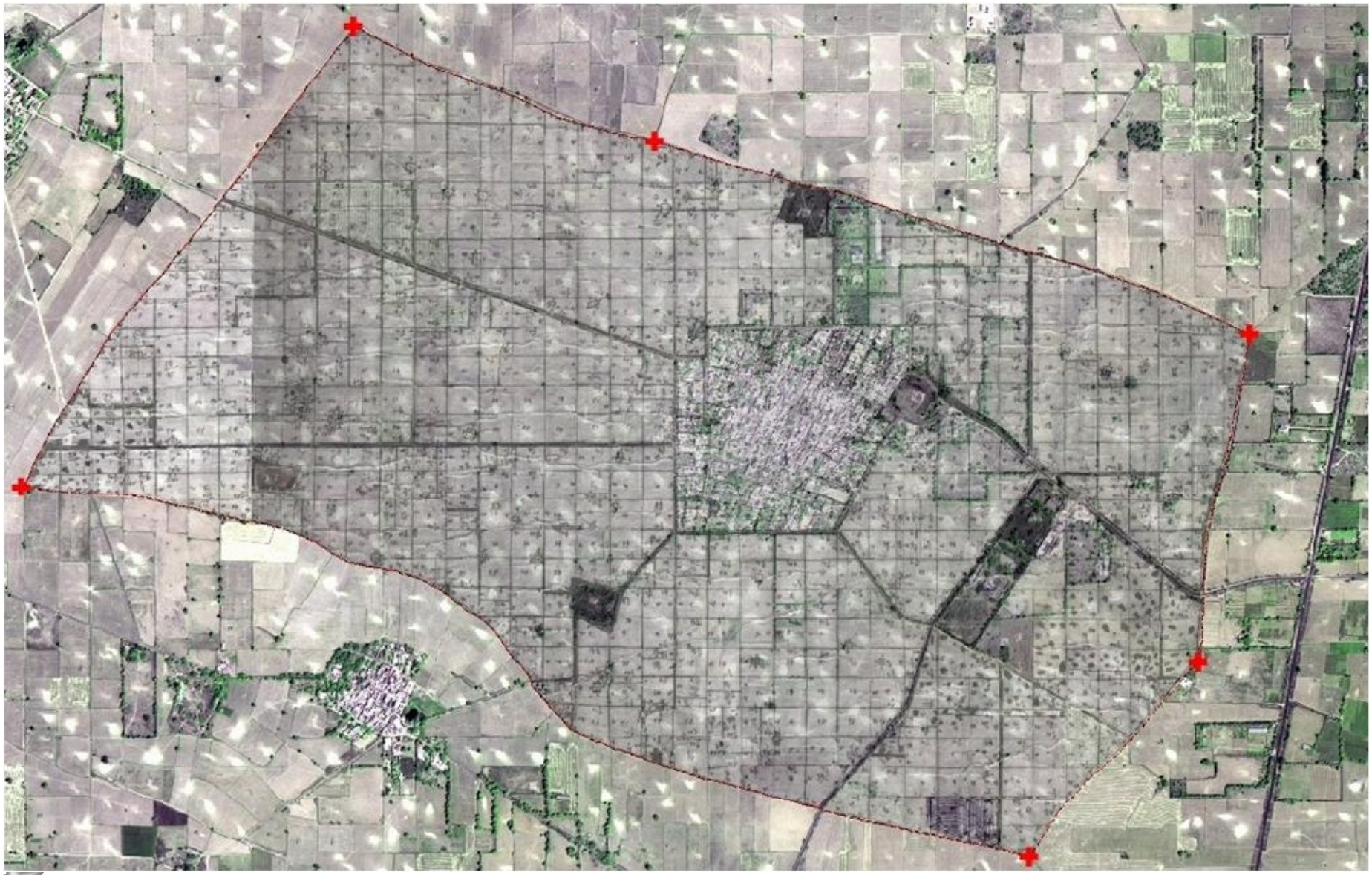
An Initiative of Govt of Delhi

(Details shown in this section with Courtesy of MD/Geospatial Delhi Limited)

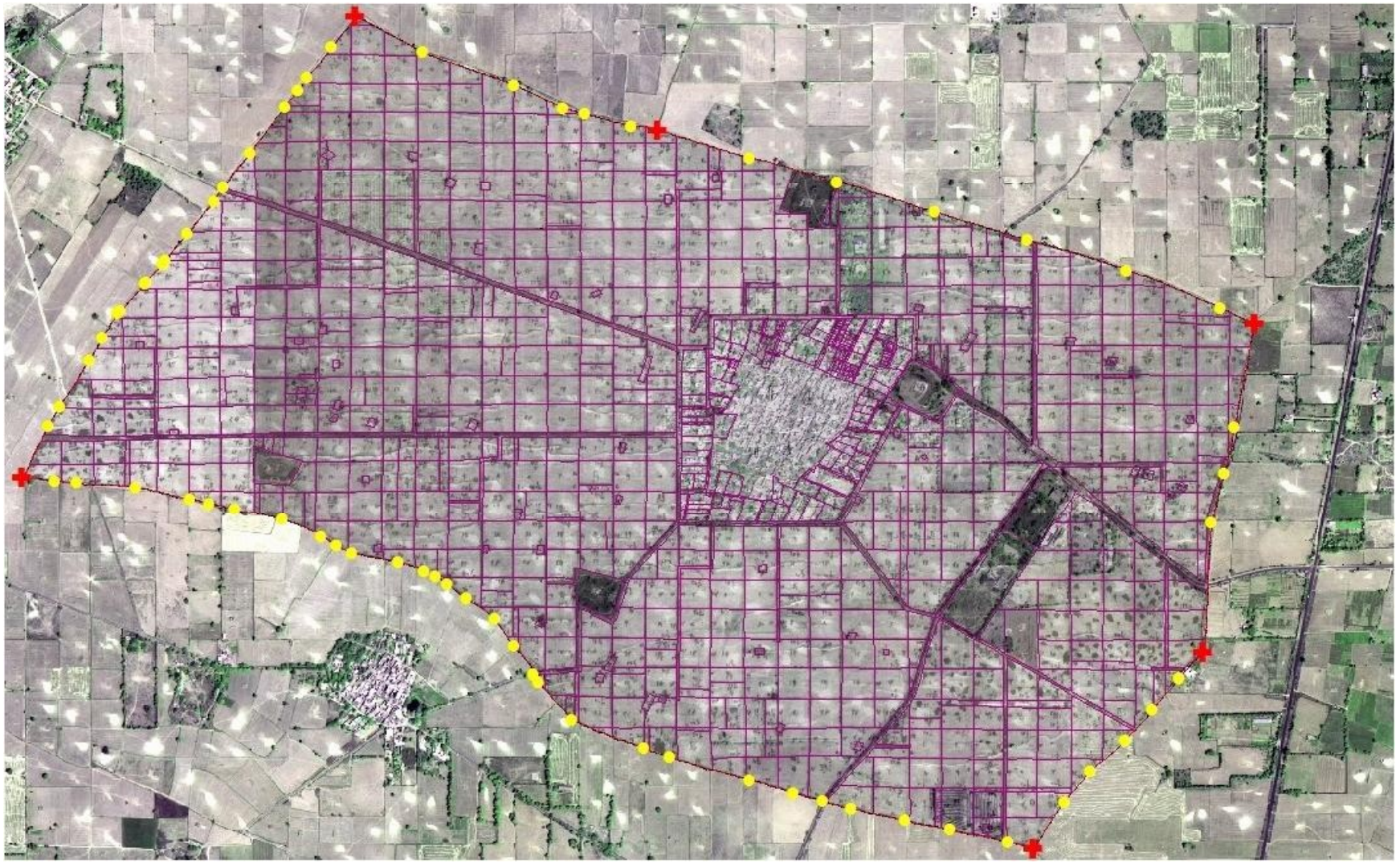
Significant Achievements

- Seamless Mosaic of Masavi for entire State of Delhi comprising of 357 villages
- Overlaying and Integration with Topographic base/ortho photo and generation of cadastral layer on scale of 1:2000 thereby improving the accuracy of the village boundaries now linked to the National Topographic datum
- Village trijunction & boundary pillars identified. Many of these were several decades old and positioned at the time of original survey.
- Patwaris have updated almost 98% of records/ mutations
- All the spatial and non spatial information has been integrated in a single platform in GIS format facilitating easy updation

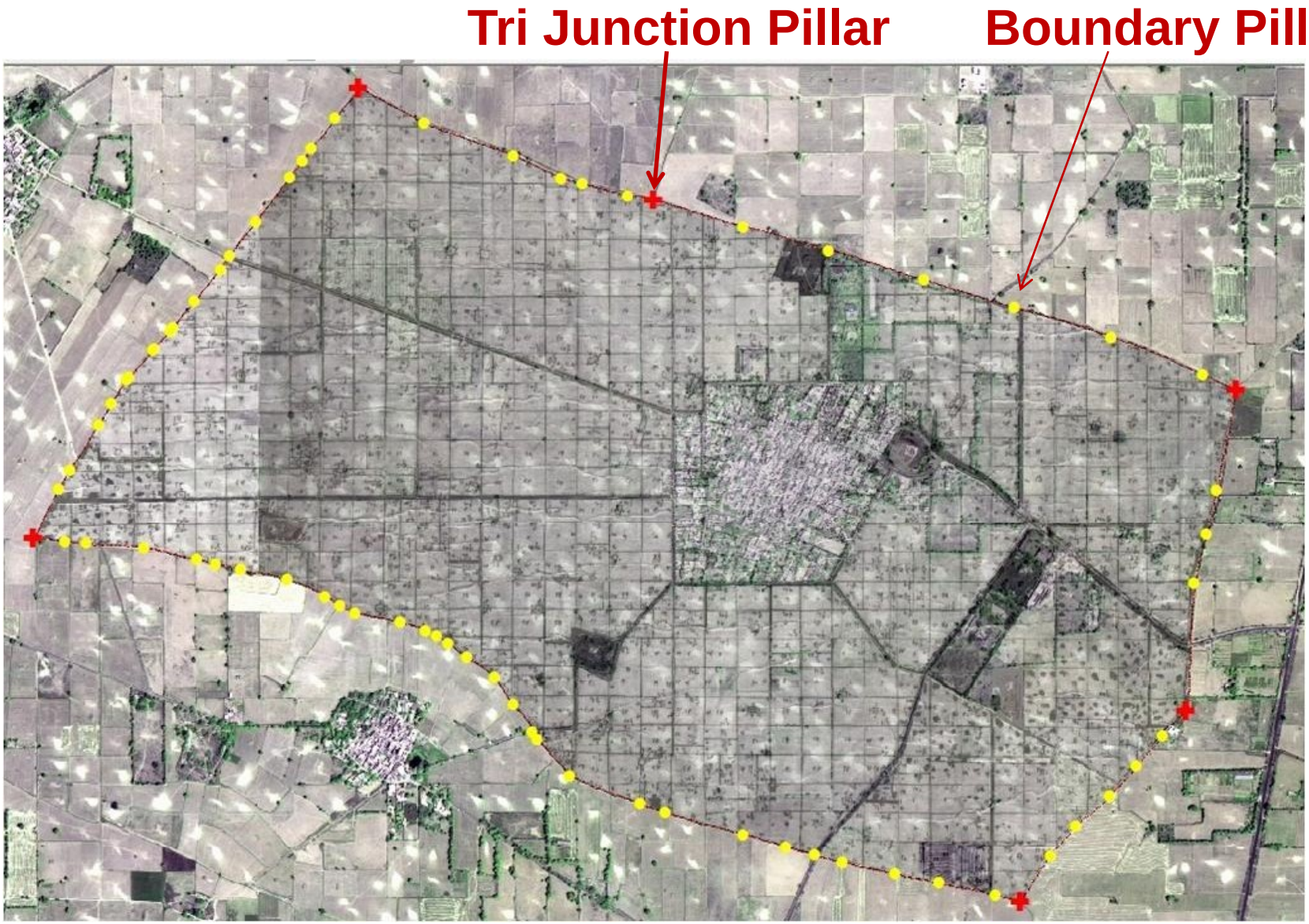
Georeferencing of Masavi with Orthophoto



Digitization of Parcel Layer

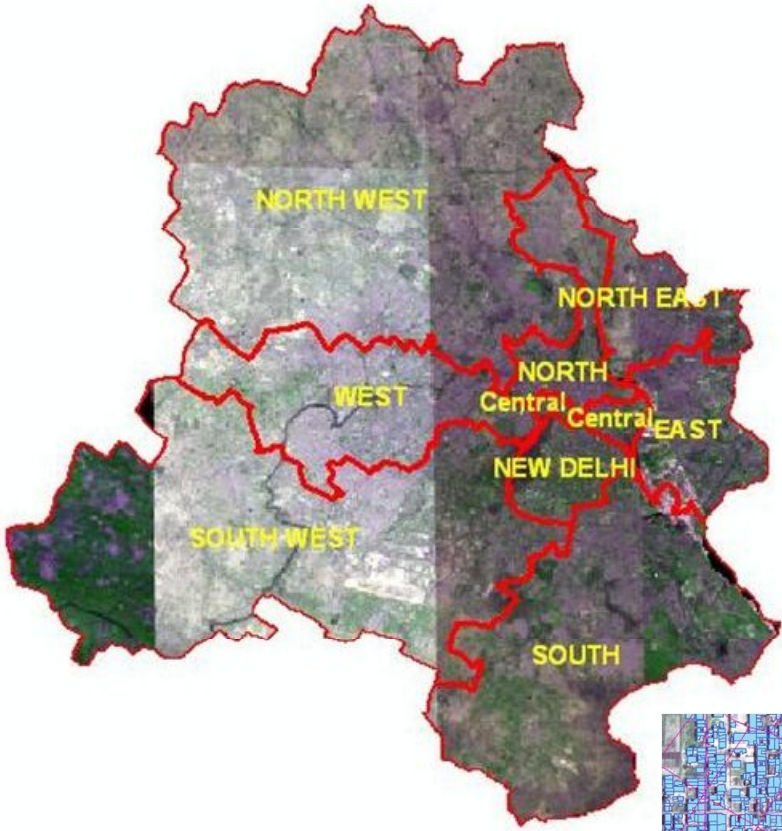


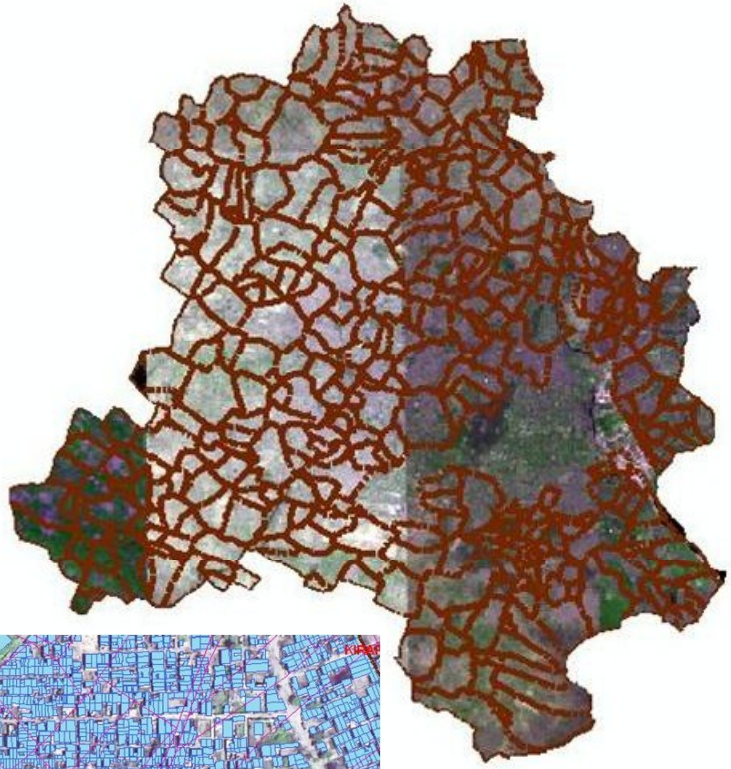
Village Trijunction & Boundary Pillar Identified



Updation by Patwaris to the Extent of 98%

Seamless Mosaic for entire Delhi





Large Scale Cadastral mapping of India with Survey of India as facilitator

CASE STUDY

Ordnance Survey Great Britain

Source : www.**ordnancesurvey**.co.uk/

Ordnance Survey Great Britain

- 216 years old, 1446 staffs, reports to Government
- After 35 years of continued losses, Ordnance Survey made Trading Fund in 1999
- TARGET SET BY GOVT: 9% return on capital employed in 5 years. Revenue to exceed cost and surpluses can be invested back but dividend to be paid to Govt.

A wave of investment

- Major investment program hallmark of Ordnance Survey in recent years
- Around 25% of trading revenue has been invested in the business since 1999
  - **Infrastructure investments** as enablers for improved data consistency, interoperability and supply
  - **Capability investments** in staff and physical fabric reflecting our evolution from a map factory to an information organization
  - **Relationship investments** – growing our ability to satisfy our customers, partners and stakeholders

National Mapping Targets

- National Positional Accuracy Improvement (PAI) Program to improve absolute accuracy of existing TOPO-96 data as well as its update
- Absolute Accuracy Target
  - Built up areas in rural towns (+ 0.4 meter RMSE)
  - Outside built up areas(+ 1.1 meter RMSE)
- Relative Accuracy Target: + 0.4 meter RMSE

Tendering & Program Implementation

- Expression of Interest Invited on 13th September 2001
- Scope: 225,000 Sq-KMs of Large Scale Mapping involving Aerial photography, Ground Control Points, AT, DTM & Ortho-photo generation, Positional Accuracy Improvement (PAI) and capturing real world change (RWC), Field verification, Delivery of final product via Internet
- Techno-commercial evaluation led to selection of 3 vendors
- Program started in 2001 and got completed in 2006.

Ordnance Survey – on demand

- 60,000 to 74,000 requests per month
- 5,000 requests per day for map images.
- Average response time for a map image to be returned to a user was **less than 0.6 seconds** with even the most detailed OS MasterMap images returned in little over a second.

DANISH CADASTRE

- 1984-86 - Cadastral register computerized
- 1997 - Cadastral maps digitized
- 2000 - internet ready GIS for whole of Denmark
  - Building & Dwelling Register
  - Municipal Register of Property
  - Cadastral Register
  - Register of Plans
  - The Land Book

SETTING TARGETS : INDIAN CADASTRE

- One single large scale map (mosaic) of Entire Nation
- Common map standard and accuracy of 1m RMSE for entire country
- Map updation every 5 years
- Map availability on internet against payment
- For urban areas maps on larger scales can be produced by municipalities

Task Magnitude:1 m accuracy Map

- 5 years mapping program would require
  - About 6 lakh sq km of mapping per year on 1:2500 scale with 1.0 meter RMSE accuracy
  - Rs 5000 crores or about Rs 1000 crores per year of financing
  - Delivery of 1 lakh sq kms of maps by each partner every year
- Deployment 40,000 production staff from Industry to achieve the desired targets
- Survey of India :
  - to undertake quality assurance and quality control activities and be custodian of the map
  - would require **doubling of its present strength**

Business Model

- Map Production through Private Sector under supervision of SOI
- The ‘user pays’ model
- Licensing intellectual property to sustain the business.
- Sale of Map via
  - Direct Sale (via Internet and counters)
  - Private Sector Partners
  - Distribution
  - Publishing
- >75% of sales revenue from Pvt sector

Public Private Partnership

- SOI to undertake public consultation : map standards, IT & GIS modules, internet bases techniques accuracy levels and type of PPP model
- Project Financing through **Public Private Partnership model targeting 15% Project IRR**. This will ensure the required debt and equity flows to the project without any budgetary supports
- Competitive bidding to select about 6 strong Indian vendors who can if required have international partners and willing to form Special Purpose Vehicle/s for Public Private Partnership with Survey of India
- For urban areas maps on larger scales can be produced by municipalities on similar approach

CONCLUSIONS

- Countries that have connected Land Administration Systems to spatial data infrastructure (SDI) and allowed it to function in the environment of an E-government and spatially enabled society have gained maximum benefits such as:
  - Direct Benefit:
    - Legal security (basic requirement for investors and credibility);
    - Access to credit (mortgage);
    - Spatial planning (consumers, producers);
    - Full Taxation leading to higher revenues (on property and land);
    - Decision making support system for Government and Private Sector.
  - Indirect Benefit:
    - Justice (cultural, ethnical, gender, wealth);
    - Good governance and transparency.
    - Environmental impact assessment;
- In the Indian Context PPP model targeting 15% Project IRR can generate required fund to complete the project in 5 years