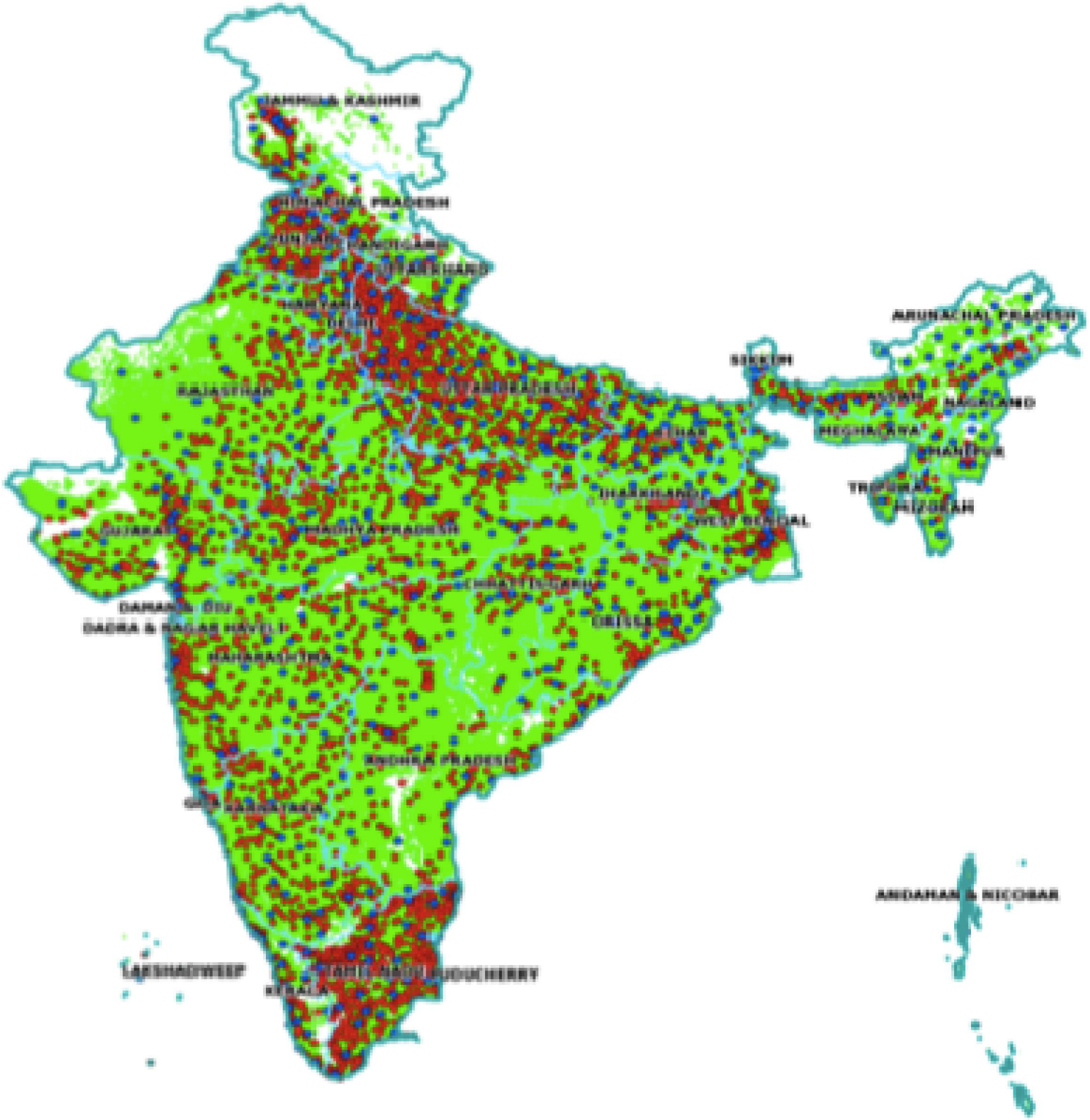
E-IRG

13th October 2010

National Knowledge Network:

An Instrument of Social Change

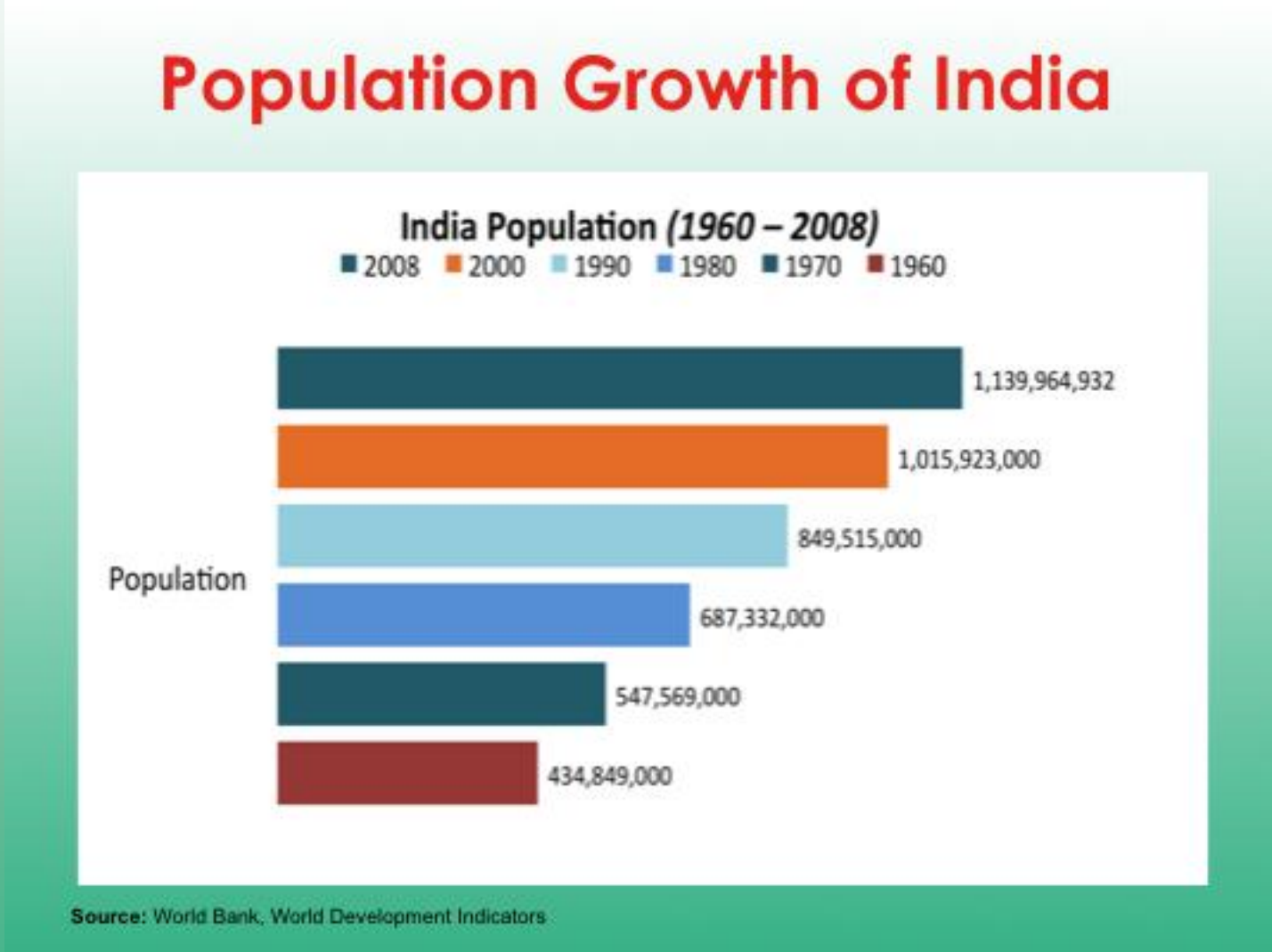
Prof. S. V. Raghavan


JAMMU& KASHMIR
HIMACHAL PRADESH
UTTARAKHAND
HARYANA
DELHI
RAJASTHAN
UTTAR PRADESH
BIHAR
SIKKIM
ARUNACHAL PRADESH
NAGALAND
MEGHALAYA
MANIPUR
TRIPURA
MIZORAM
JHARKHAND
WEST BENGAL
GUJARAT
MADHYA PRADESH
CHHATTISGARH
ODISHA
DAMAN & DIU
DADRA & NAGAR HAVELI
MAHARASHTRA
ANDHRA PRADESH
KARNATAKA
GOA
LAKSHADWEEP
KERALA
TAMIL NADU
PUDUCHERRY
ANDAMAN & NICOBAR

How Big is it?
How Many People are there?
How Wealthy are They?

India and Indians

* 1.3 Billion People;
* ~2500 KMs diagonal Rhombus Area;
* Mountainous Terrain in many parts; 70% of Population in Villages;
* 200,000 Villages; 650 Districts (Provinces)



India and GDP Growth

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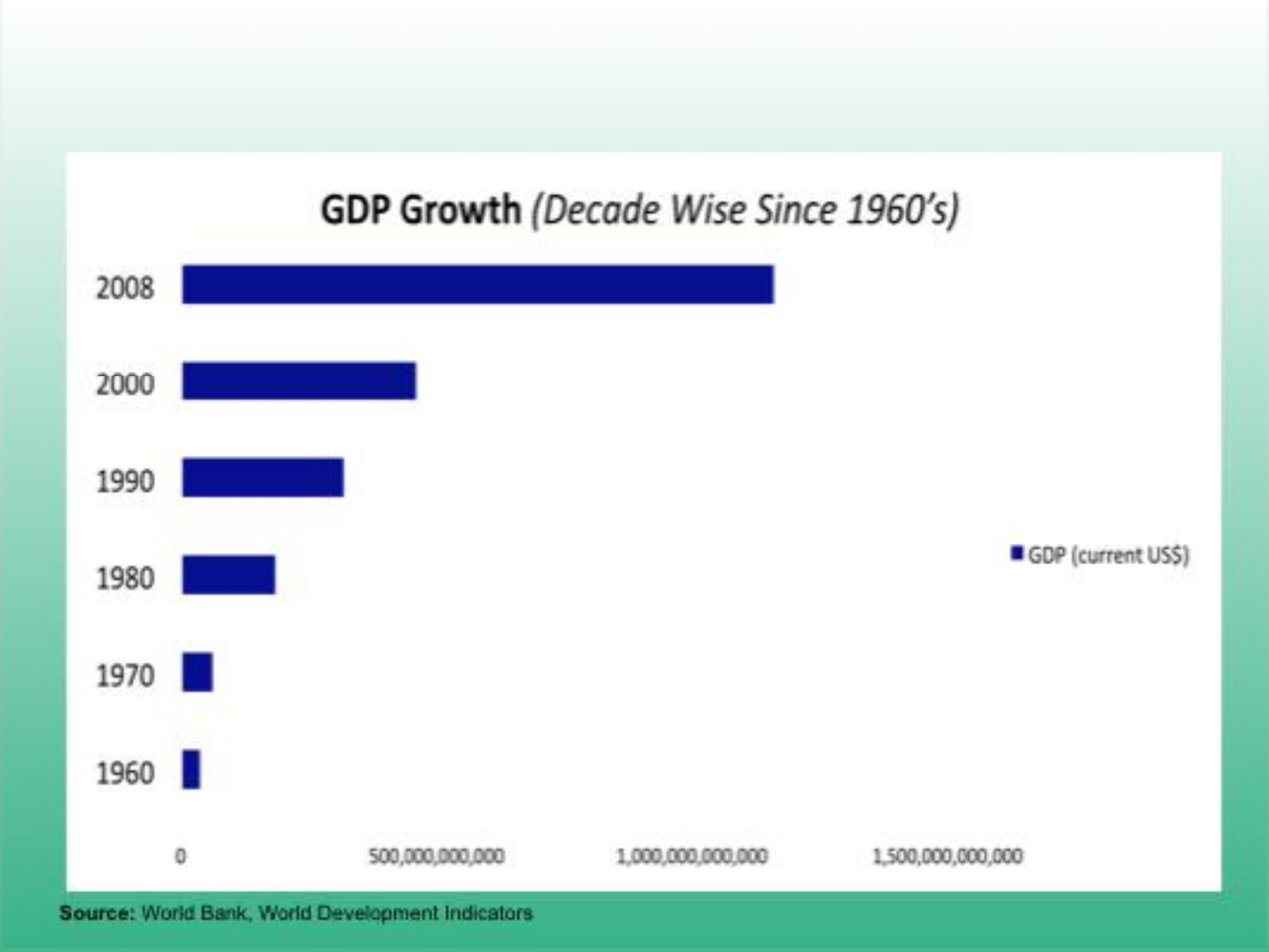

India and GDP...

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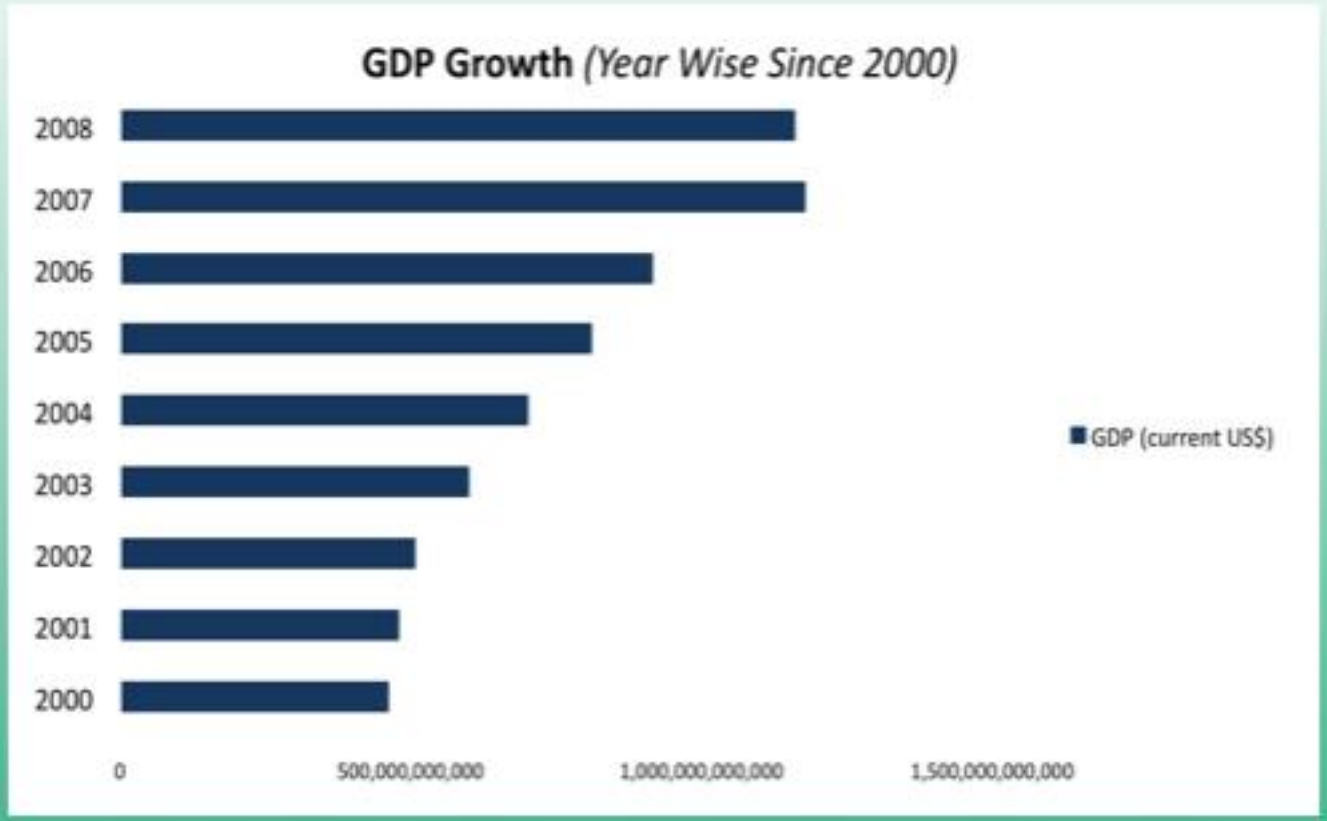
GDP Growth: Year wise



Source: World Bank, World Development Indicators

What do they want?

Education Institutions in India

S.No	Category	1950-51	1960-61	1970-71	1980-81	1990-91	1999-00	2006-07
1	Primary / Junior Basic Schools	209671	330399	408378	494503	560935	641695	**784852**
2	Middle / Senior Basic Schools	13596	49663	90621	118555	151456	198094	**305584**
3	High Sch. / Hr. Sec. Intermediate / Pre-degree / Jr. College	7416	17329	37051	51573	79796	116820	**169568**
4	Colleges for General Education	370	967	2285	3421	4862	7782	**11458**
5	Professional Education	208	852	992	3542**	886	2124	**7024**
6	Others (Including Research Institutions)	NA	NA	NA	NA	NA	NA	**2769**
7	Universities / Deemed Univ. and Instt. of National Importance	27	45	82	110	184	244	**368**

** *Includes institutions for Post-Matric courses*

Source: Ministry of Finance: Report on Selected Education Statistics 2004-05

How does INDIA Decide?

Decision Centers

- ~ 30 Legislatures
- ~ 580 Vice-Chancellors;
- ~ 600 Academic Senates
- ~ 700 Ministers;
- ~ 3000 Bureaucrats;

Her Strength

India: Size and Opportunities

- 200 Laboratories (150,000 Scientists)
- 600 Institutions of Higher Learning (IITs, IIMs, Univs.,etc); 30,000 Colleges; 250,000 Schools
- ~50,000 Courses Per Hour from Institutes of Higher Learning

India: Size and Opportunities

- 1,200,000 Students at +2 School Level; 800,000 Students at College Level
- Impressive Demography
- Very Large Young Population and Work Force

India: Size and Opportunities

- Large Public and Private Sector Companies
- World renowned IT Sector
- Fast Emerging Bio-, Nano Sectors
- Rich repository of Traditional Knowledge
- Significant accomplishment of Indians World Wide

Current Status of ICT

ICT and Ground Realities

* Network for Education Sector (Ernet - started in 1985)
* Network for Government (Nicnet)
* Government owned Public Sector Units in Telecom Space (BSNL, RailTel and PowerGrid)
* Private Sector Telecom Operators (Reliance, Airtel, TataComm)
* ~250 Internet Service Providers (ISPs)
* Fiber to all Districts (Provinces - ~650)
* Fiber to Villages under Progress (~ 200,000)

Relevance

- Institutions of Higher Learning are in Urban India
- Most Universities and Colleges are in Semi-Urban India
- Most Schools are in Districts and Villages

Relevance

- TSPs Concentrate on Urban Areas; PSUs are notable Exception
- ISPs - High End Services are in Urban and Low End Services are in Semi-Urban and Rural Areas.
- Fiber-ing and Wireless - ing the Country is a Step towards a well rounded Inclusive Growth

Key Changes

- 100 Mbps – 1 Gbps is the current trend
- Communication quantum (data bits transferred per session) exceeded expectations in the last 5 years
- More running data bits available for processing
- Increase in computation power allows significantly higher rates of processing (coupled over Clouds)

Confidence

Research in India

- Basically centered around IITs and IISc
- Some leading Universities are part of it.
- Very good understanding from Physics, Optics, Transmission, Modulation, Coding, Devices, FPGA based solutions, Data and control stacks, Open source, Large Scale Design and simulation, Collaborative engineering design, Infrastructure creation, and so on.

How do we go forward
and
Create the Nation
that understands the needs
of Her Children?

Why Think in an Integrated Manner?

- Individual research institutes and IITs autonomous
  - Can focus on specific and specialized aspects of research challenges in different fields
  - Each research addresses a few aspects of a research problem
- Two minds are better than one – for certain types of research challenges.
  - Helps address different social and cultural aspects which are critical to understanding the magnitude of a problem.

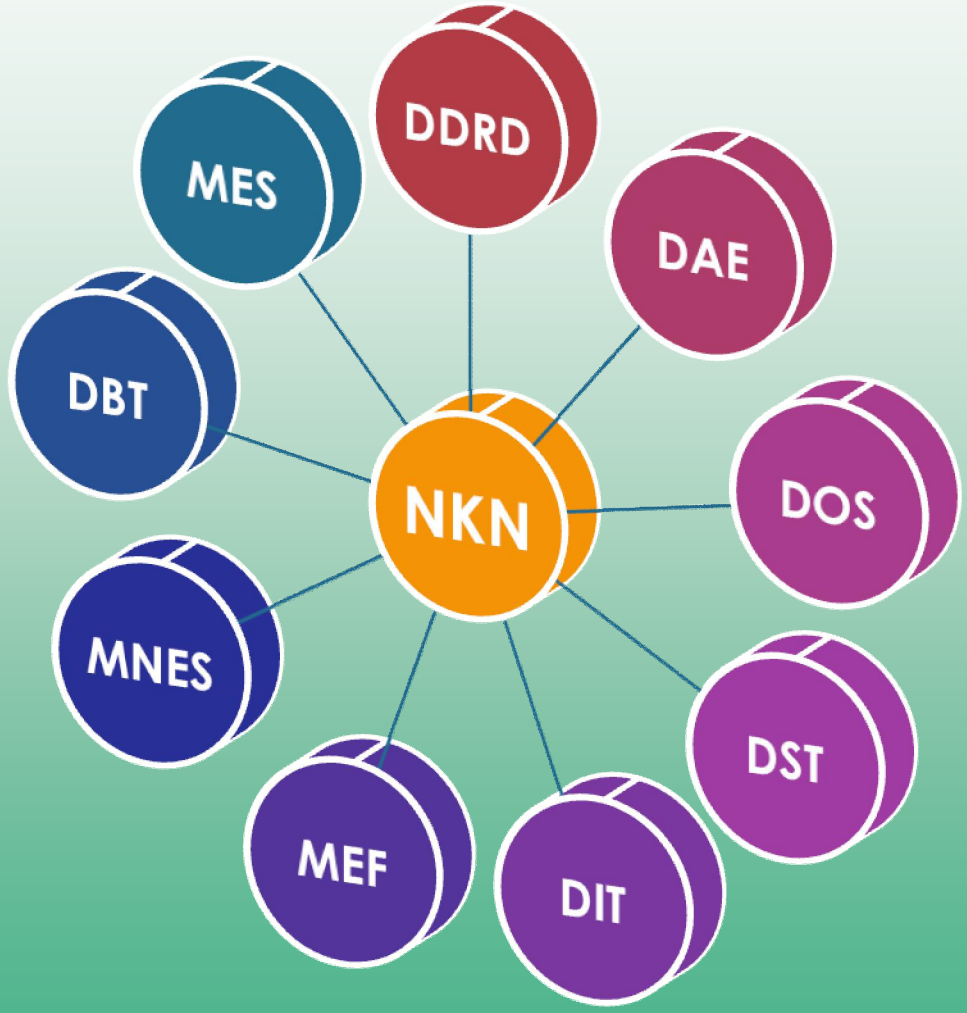
Why Think in an Integrated Manner?

- Nation needs to integrate all aspects of the solution under a single banner
  - NKN is that medium
    - Also brings together brilliant minds from different corners who share common enthusiasm for sharing knowledge
- Consolidation of infrastructure and technology to train intelligent minds to adapt to newer waves of technology changes

S & T Research and Synergy

- Problem Size and Complexity
- Divide and Conquer
- Critical Mass of Scientists and Engineers
- Intensive Interaction at all levels
- Liberal use of ICT in normal work
- Automation and Remote Access to Experiments and Facilities

Bringing together the Accomplishments of Scientific Ministries and Departments of the Government of India



Creating Synergy Across Institutions of Higher Education and Research in India

Synergy was the Mantra

Understanding Human Welfare and Development by Bringing together Education and Research in Health and Agriculture in India

NATIONAL KNOWLEDGE NETWORK:

WELCOME TO n x 10,000,000,000 BITS PER SECOND !

Why NKN?

NKN creates the ambience to bring together Science, Technology, and Higher Education

In other words NKN is

ICT* for Human Development

Focusing on

Education, Health, and Agriculture

ICT - Information and Communication Technology

Property of ICT that Attracts... Attention…

Annihilation of Distance

Ultra High Bandwidth

Near Instantaneous Observation of Events

Low Latency

The Benefits: Education

- Access to Secondary and Higher Education
- Social Equity
- Quality Teachers and Quality Lectures
- Virtual Access to Expensive Laboratories
- Enable to see and Empower to Visualize
- Inculcate Scientific thinking
- Remove economic and social differences

- ***Educated Nation is a Creative Nation***

The Benefits: Health

- Modernizing Public Health Centers
- Digital Health Information
- Access to Highly Competent Doctors
- Virtual Reality – No Fiction
- Timely Detection and Cure
- ***Healthy Nation is a Productive Nati***

Seeing is Believing

WHY?

- Computational Resource Access
- Critical Mass of Scientists in Key Areas
- Common Country-wide Classrooms
- Increased Peer Group Interaction
- Data Bases Sharing Online

Application Requiring High Bandwidth

- Virtual Laboratories
- Collaborative Mega Science Projects
- Innovative Info-Bio-Nano Experiments
- Non-invasive Medicare for Diseases like Cancer
- Diagnostic Domes as Public Health Centers in Rural Areas
- Country-wide Classroom
- University without Walls
- Voice & Video Conferencing among Researchers
- On-line access to Electronic Resources

Life @ n x 10 Gbps

- Scenario #1: **Education**
- Scenario #2: **Research**
- Scenario #3: **HealthCare**
- Scenario #4: **Governance**
- Scenario #5: **FarmCare**
- Scenario #6: **HPC: Weather Modeling**

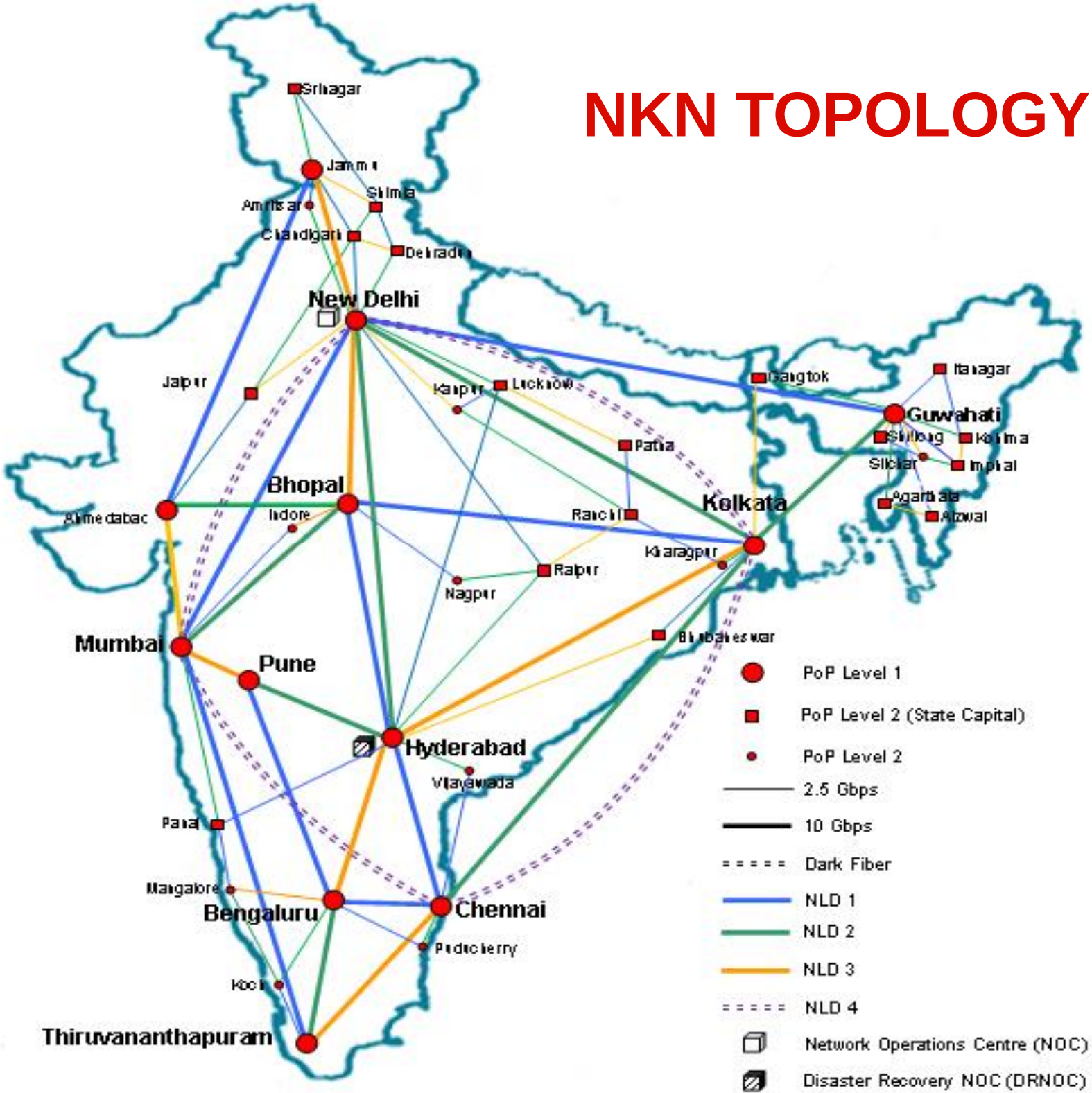
NKN Design Philosophy

- To build a scalable network, which can **expand** both in the **Reach** (spread in the country) and **Speed**.
- To be a common Network **Backbone** like national highway, wherein different categories of users shall be supported.

Features NKN

- High Capacity, Highly Scalable Backbone
- Provide Quality of Service (QoS) and Security
- Wide Geographical Coverage
- Common Standard Platform
- Bandwidth from Many NLD's
- Highly Reliable & Available by Design
- Test beds (for various implementation)
- Dedicated and Owned.

NKN TOPOLOGY



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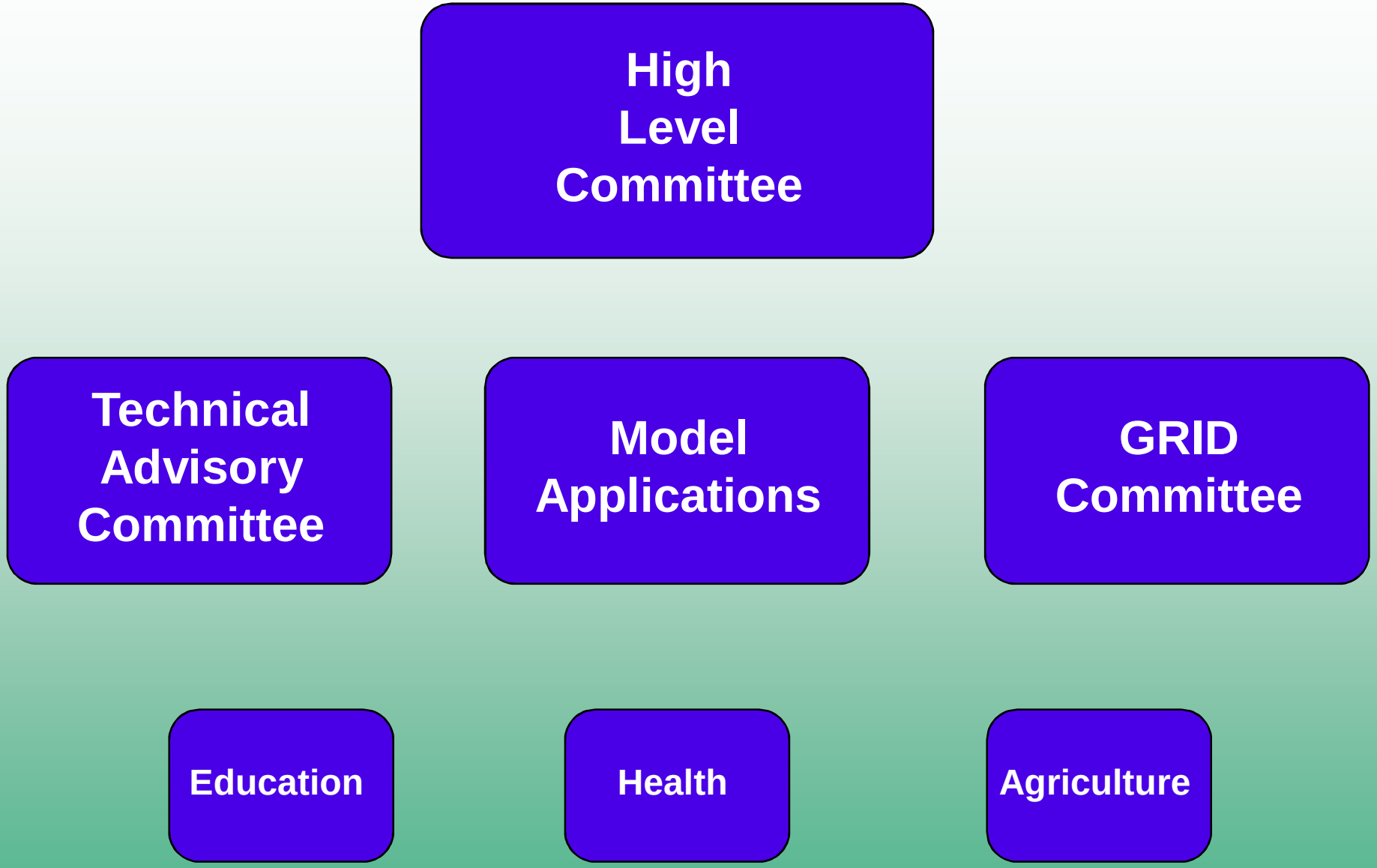
High Level Committee
Technical Advisory Committee
Model Applications
GRID Committee
Education
Health
Agriculture

Thank You