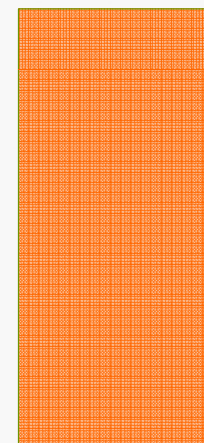


Inclusive and Sustainable Innovation

An agenda for India



In 1980's in India

- Wait-list of eight years for a telephone
- Buying a scooter had a queue of four years
- Getting a new LPG gas cylinder was impossible
- A one way flight from Chennai to Delhi would cost six months of a Assistant Professor's salary
- Importing a PC or an electronic component would take a year

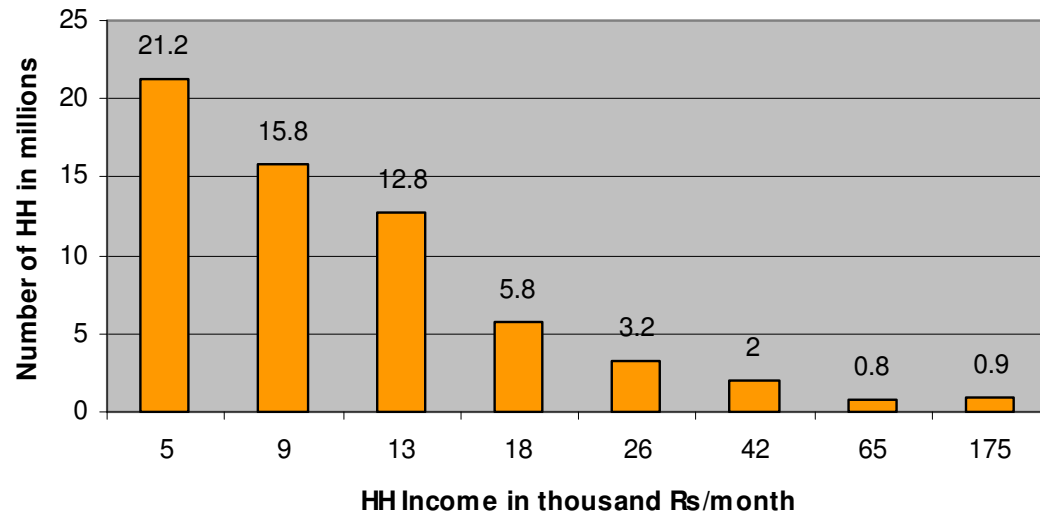
Life was difficult
even for upper middle class

Somewhere India Learned

- India is a very large market
 - But at the right price point: Affordability
- Entrepreneurship is the best and fastest driver of development
- S&T can be used to make changes in India
 - Technology level: to make products affordable to Indians
 - Operations level: organizations / business which can scale
 - Policy level: to help business work
 - S&T personnel in a unique position to influence policies

Fortunately India got moving

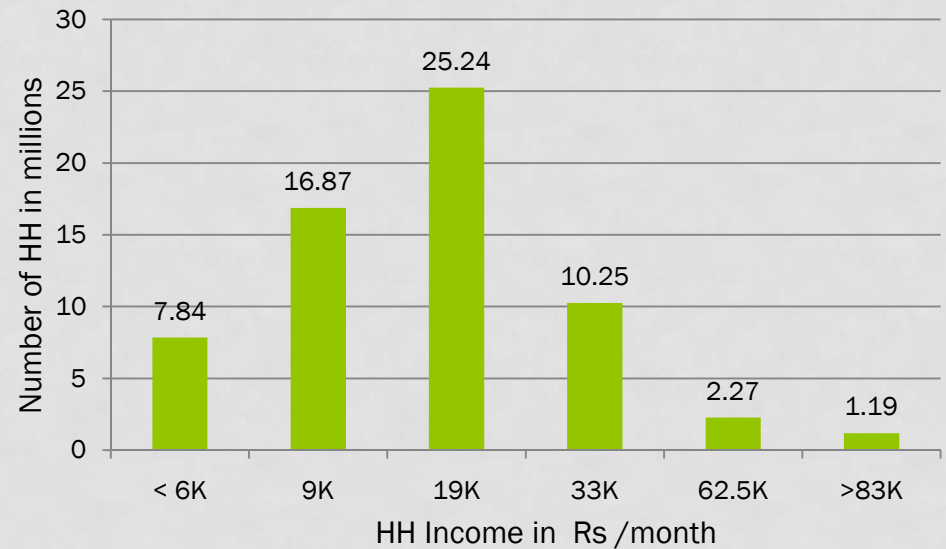
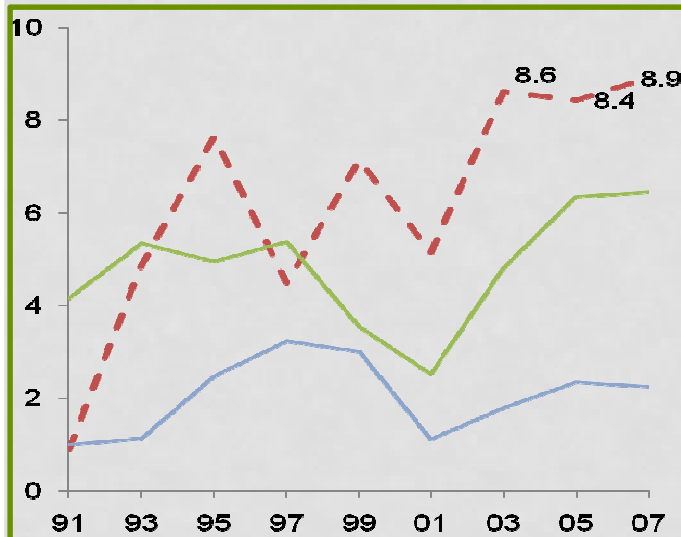
As economy grew, Urban India changed



2001

65 million urban homes

2007



India on Move

- India adds 15 to 20 million phones per month (Tariff as low as 1 cent per minute)
- Airline Industry is booming: six times passenger capacity in five years
 - Tariffs fall to a fourth inspite of rising petrol prices and poor infra: affordable to middle class
- Auto Sector is booming: emerging as leader in auto-component design and manufacturing
 - R&D driven initiative: Scorpio and Tata-Indica and now Tata Nano
- India's cement plants in 90's virtually closed as they could not compete
 - Today India has some most energy efficient plants of the world
- India's wind energy company is the fastest growing one in the world
- carrying out successful Drug discovery -> Spends USD50-70M per drug (800M in USA)
- India graduates 1.5 million engineers a year -> Quality is indeed a challenge

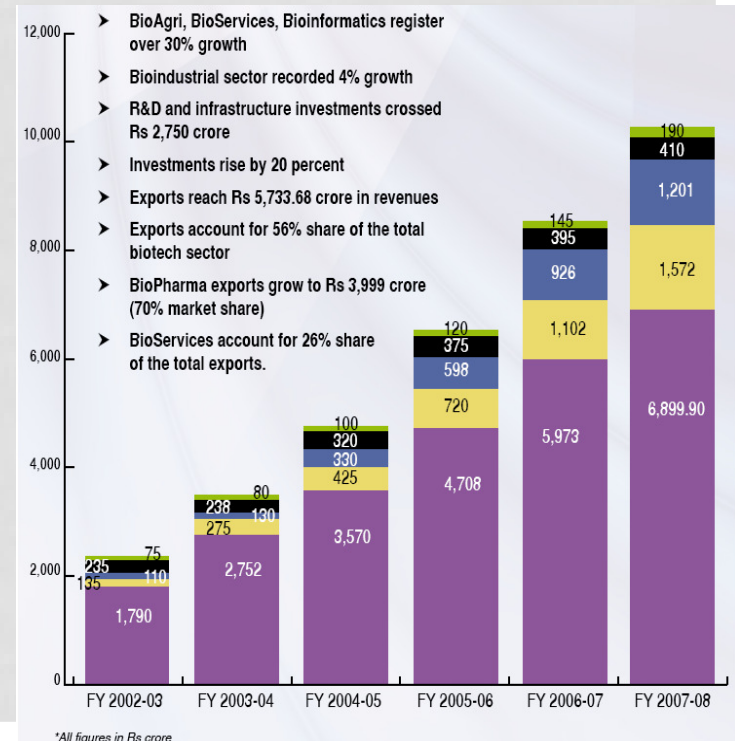
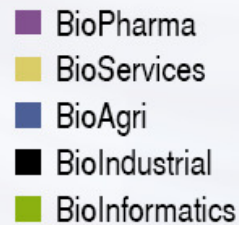
Industry used R&D and Innovation to drive Growth

- Mahindra spent Rs 600 Crores to develop Scorpio
- Tata spend similar amount for Indica and Indigo
 - Higher amounts on Nano
- Biotech Industry is spending huge amount of money on research
- Telecom Industry did immense work in bringing down its CAPEX and OPEX to enable tariff under 1 cent / minute

India Biotechnology Opportunities

- Drug Discovery/Optimization/ informatics/ Novel delivery
- Process development /drug manufacturing
- Pre-clinical & Clinical Development
- Ag Biotech

- Makes Innovation in R&D and Manufacturing Affordable
- Innovative and cost effective process engineering skills
- Indian players account for about 25-30% of the total DMFs filed with the US FDA
- largest vaccine producer in the world: 50% of vaccinated
- highest number of US-FDA approved facilities outside USA



And growth of India's IT industry is legendary

- crosses 70B USD per year
 - and Targeting to be a trillion dollar industry

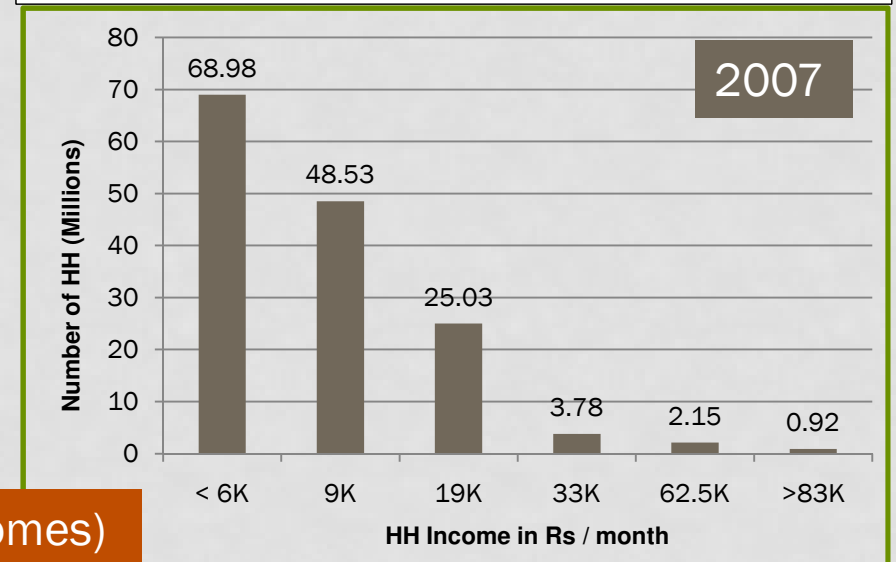
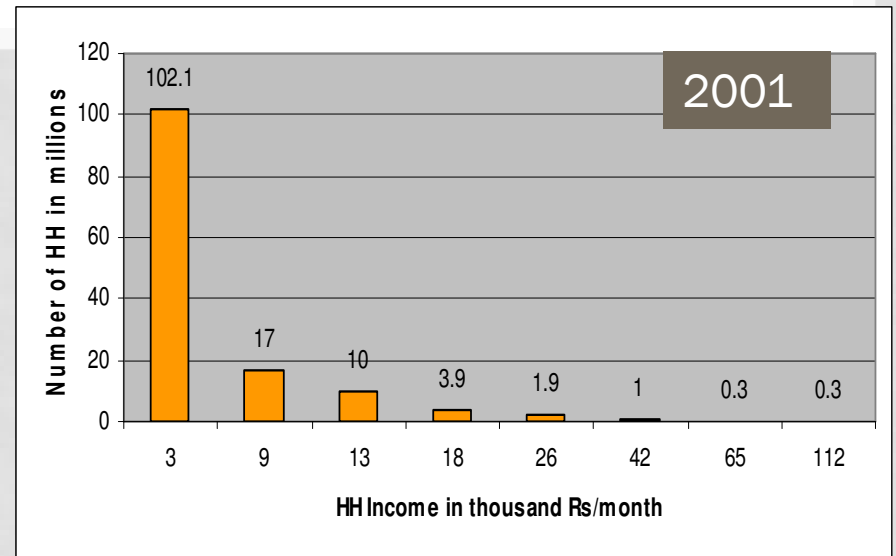
The World is Flat

But you aint seen nothin yet

for the changes has not yet touched Rural India

Dilemma I: Rural India is still far behind

- Media has grown, reaches villages and is independent
 - shows the disparity between urban and rural life everyday
- Indian democracy is strong
 - Gives opportunity almost every two years for people to vote out
 - Governments and policies which leaves them behind
 - Singrurs are a reflection of this
- Politically unsustainable
 - Government reacts: make social programs its primary emphasis
 - Ahead of infrastructure for growth
 - NREGS, NRHM, NRLM, Bharat Nirman



(700M people, 140M homes)

Dilemma II: Can we all “Grow”?

- India consumes
 - Less than a fifteenth of per capita resource as compared to that in the West
 - as per IEASD, India consumed 512.4 Kg of oil equivalent of energy per person as opposed to 7794 Kg in USA in 2003
- If India and China grow like West?
 - And their per capita resource consumption of 1.4 billion Chinese and 1.1 billion Indians reach even half the level in the West
- Nature is already retaliating
 - This can not be our future
 - Technology can help but cant support consumption beyond a point
- And yet, India and China can not be asked to wait to get out of their deprived state
- AND they can not grow and acquire the same lifestyle as that of the West

Innovation is the only answer

- Inclusive and Sustainable Innovation
 - To continue driving growth
 - India's per capita GDP is still only USD 1200
 - To enable Rural India grow even more rapidly
 - Create jobs in rural India
 - To avoid the path followed by the West (post-industrial revolution paradigm)
 - More one consumes, better it is for economy
 - Technology can find all the answers
 - Urban life is better than that of rural
 - urban India will be center of economy, knowledge, culture
 - But per capita energy urban consumption is 15 times that of rural India
 - Innovate to Make Rural India a preferred place to stay

To enable Rural India

- TeNeT / RTBI at IIT Madras has focused on using entrepreneurship leveraging ICT to
 - build Technologies and Business Models
 - and incubate enterprises that can scale
- World-over rapid development in 20th centuries took place due to outsourcing of manufacturing and services
 - started with routine services, but the nations used this to build skills and acquire business and technical leadership
 - Can we now outsource manufacturing and services to villages and generate wealth and confidence?

Services & Manufacturing outsourced to villages

- Manufacturing contracts not involving heavy machinery and large power
 - Advantageous if some raw materials are from villages
- Creation of Rural Delivery Model (RDM)
 - Enable technology to move work to where people are, rather than move people
 - Can we have a 25 seater BPO in each village employing 50 people?



Agriculture: Managing Risks for farmers



Before
Okra crop
turning white

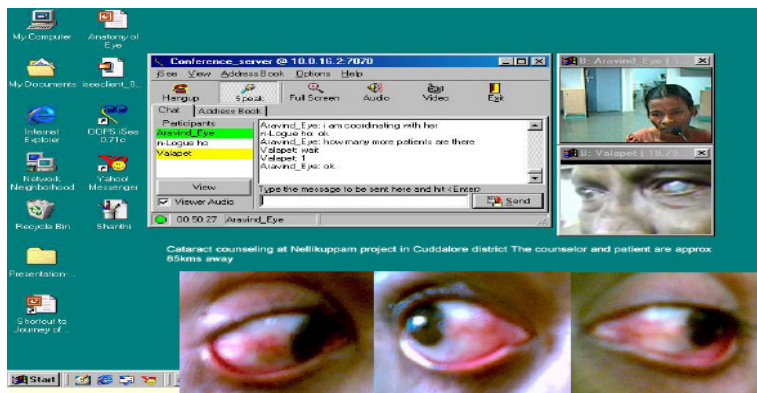
Pictures sent
to the experts
at Madurai
Agricultural
College:
diagnosed it as
"Yellow Mosaic
disease"



After

- Crop disease: video conferencing to connect an agricultural Expert
 - Obtaining answers before it is too late
- Rain-fall insurance
 - Micro-weather Measurement and prediction
 - Collect Temperature, humidity, pressure, wind speed, wind direction and rainfall at each village
 - Weather Monitoring Kit : \$400
- Market risk: use of commodity exchanges forward pricing and Options
 - Can one get small farmers to use it?





Remote Eye Care



Vet care with Veterinary college

Strengthening Health Care: Telemedicine

- ❑ Initial experiments with eye-care and with Veterinarian using the video conferencing
- ❑ Moved on to video-consulting for GP & gynecology problems
- ❑ Designed Telemedicine kit costing \$300
- ❑ Focus on Village Health Practitioners: Training, Medicine Basket, Test systems, Referral



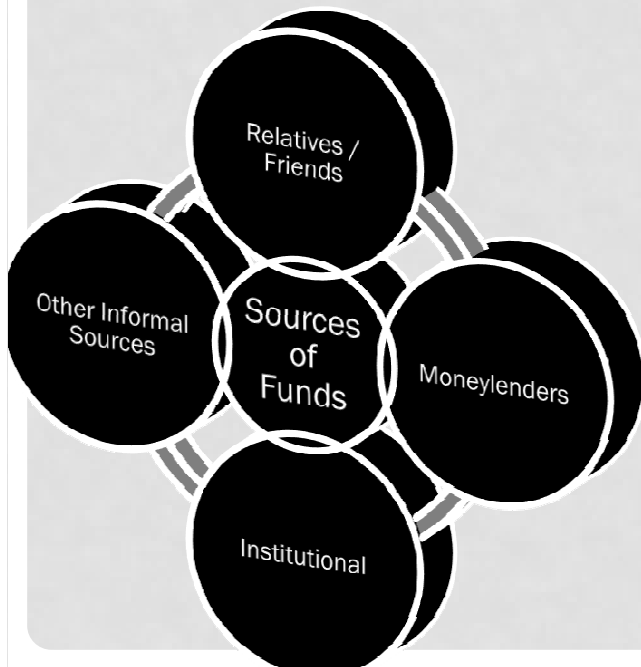
Banking in Rural India

- Working to have a bank-outlet (BCs) at each village using Voice-banking (Mobile)
- cash-in / cash-out
 - Using Rural ATMs
 - At a price point close to a fifth of regular ATMs
 - Powered on solar
 - Using Business Correspondent



GramaTeller

 vortex



- Unique ID will enable Credit rating of rural customers
 - ▶ Simple overdraft credit can meet
 - ▶ most emergency consumer needs in rural India

To Sum Up

- India needs plenty of Inclusive and Sustainable Innovation
- Can Europe and India R&D partnership be centered around it?