Science Transforms World

Innovation In Science Pursuit For Inspired Research

Science

– *Career for Next Generation*

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Mysuru

PRESENTATION OVERVIEW

- Introduction
- Science and Engineering
- Marvels of Science & Engineering
- Technology Advancements
- Role of GenNext
- Conclusion

INTRODUCTION

Apple falls down from a tree due to earth's gravity

Explanation of this is **'SCIENCE'**

Apples can be collected in the basket because gravity makes them stay in the basket

This is **'ENGINEERING'**

Science Transforms World

SCIENCE – A COMMON PLATFORM

Ever Wondered?

Communication

Medical

Information System

Space

Defense

Security System

E-governance

Materials development

Manufacturing Technology

Robotics

ERP

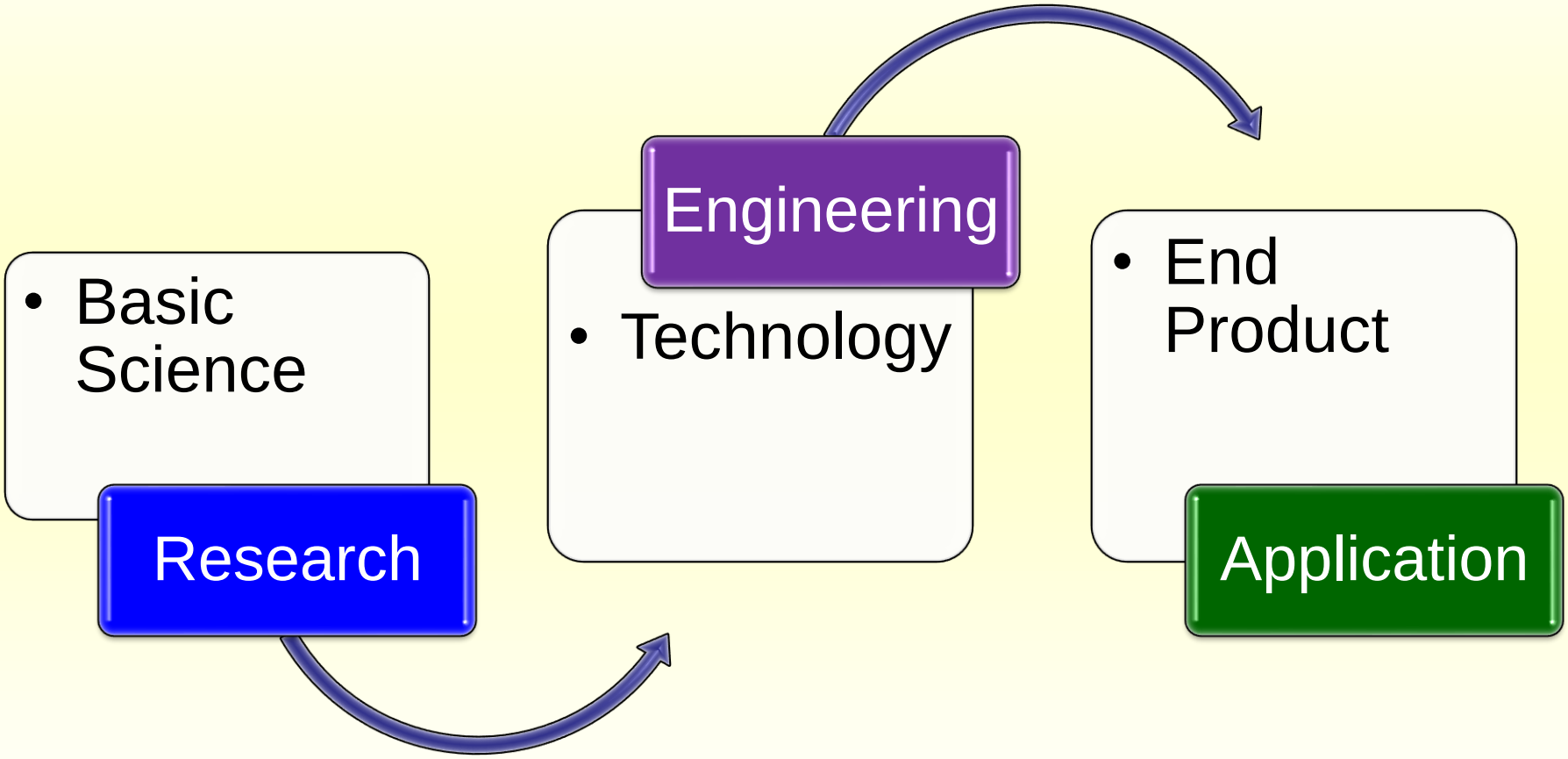
Artificial Intelligence

Chemical Engineering

Embedded System

TECHNOLOGY

Basic Science Leads to Technology & Engineering



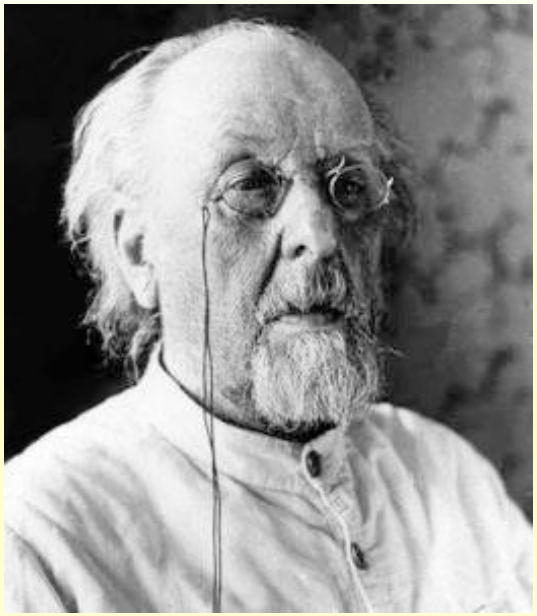
TECHNOLOGY INDUCTION CYCLE

Ordinary Beginnings – Extraordinary Contributions!

Chandrasekhara Venkata Raman

- **Born in** Thiruvanaikoil, Trichy, Tamil Nadu
- Working as Accountant General , he began conducting research at the Indian Association for Cultivation of Sciences during his free time
- Research was basically in the areas of vibrations and acoustics.In 1917, he got the opportunity to join the University of Calcutta as the first Palit Professor of Physics.
- Late 1920s he experimented on the scattering of light by observing the behavior of monochromatic light which penetrated transparent materials and fell on a spectrograph. This led to the discovery of what came to be known as ‘Raman Effect’ which he presented at a meeting of scientists in 1928.
- 1948 - Established the Raman Research Institute (RRI) in Bangalore for conducting scientific research in different fields of physics
- 1930 Nobel Prize in Physics "for his discovery of the Raman Effect“ and was honored with the Bharat Ratna, in 1954 in recognition of his invaluable contributions to the field of science.

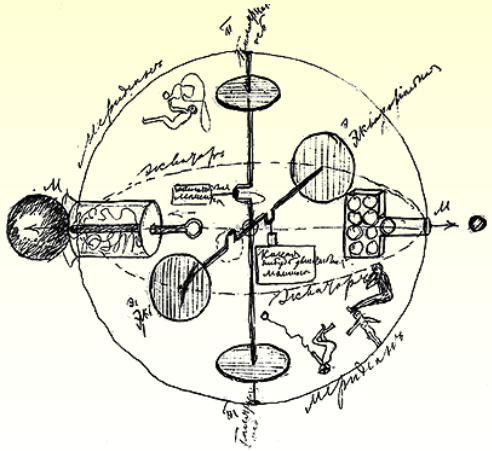
Ordinary Beginnings – Extraordinary Contributions!



- Founding father of rocketry
- Born in Izhevskoye a remote place in Central Russia in 1857 in a middle-class family
- At the age of 9, Konstantin became deaf
- He was not admitted to elementary schools because of his hearing problem
- He fell behind in studies, but later with the help of his mother started studying
- He was one of the first humans who believed that travel to space and colonizing space is possible

Konstantin Tsiolkovsky

Around 1880 – 1890 he generated designs for rockets with steering thrusters, multi-stage boosters, space stations, airlocks for exiting a spaceship into the vacuum of space, and closed cycle biological systems to provide food and oxygen for space colonies



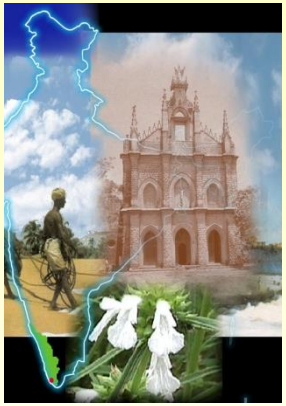
MARVELS OF SCIENCE

Ordinary Beginnings – Extraordinary Contributions!

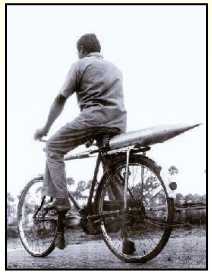
Dr Vikram A Sarabhai

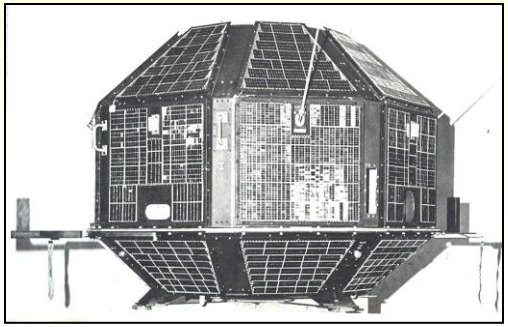
- Founding father of Indian Space Programme
- He was man who believed that space is a solution for most of the problems in the society

"There are some who question the relevance of space activities in a developing nation. To us, there is no ambiguity of purpose. We do not have the fantasy of competing with the economically advanced nations in the exploration of the moon or the planets or manned space-flight. But we are convinced that if we are to play a meaningful role nationally, and in the comity of nations, we must be second to none in the application of advanced technologies to the real problems of man and society." - Dr Vikram A Sarabhai

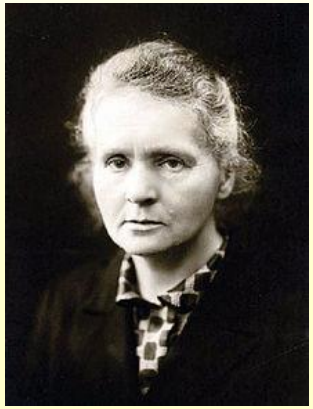


Modest Beginnings …





Ordinary Beginnings – Extraordinary Contributions!



Marie Curie.

- Born in Warsaw, Poland in 1867
- Was a physicist and chemist who conducted pioneering research
- Achievements: Development of the theory of radioactivity and
- Techniques for isolating radioactive isotopes & the discovery of two elements, polonium and radium
- First woman to win a Nobel Prize &
- only person to win a Nobel Prize in two different sciences

Ordinary Beginnings – Extraordinary Contributions!

M. Visvesvaraya G

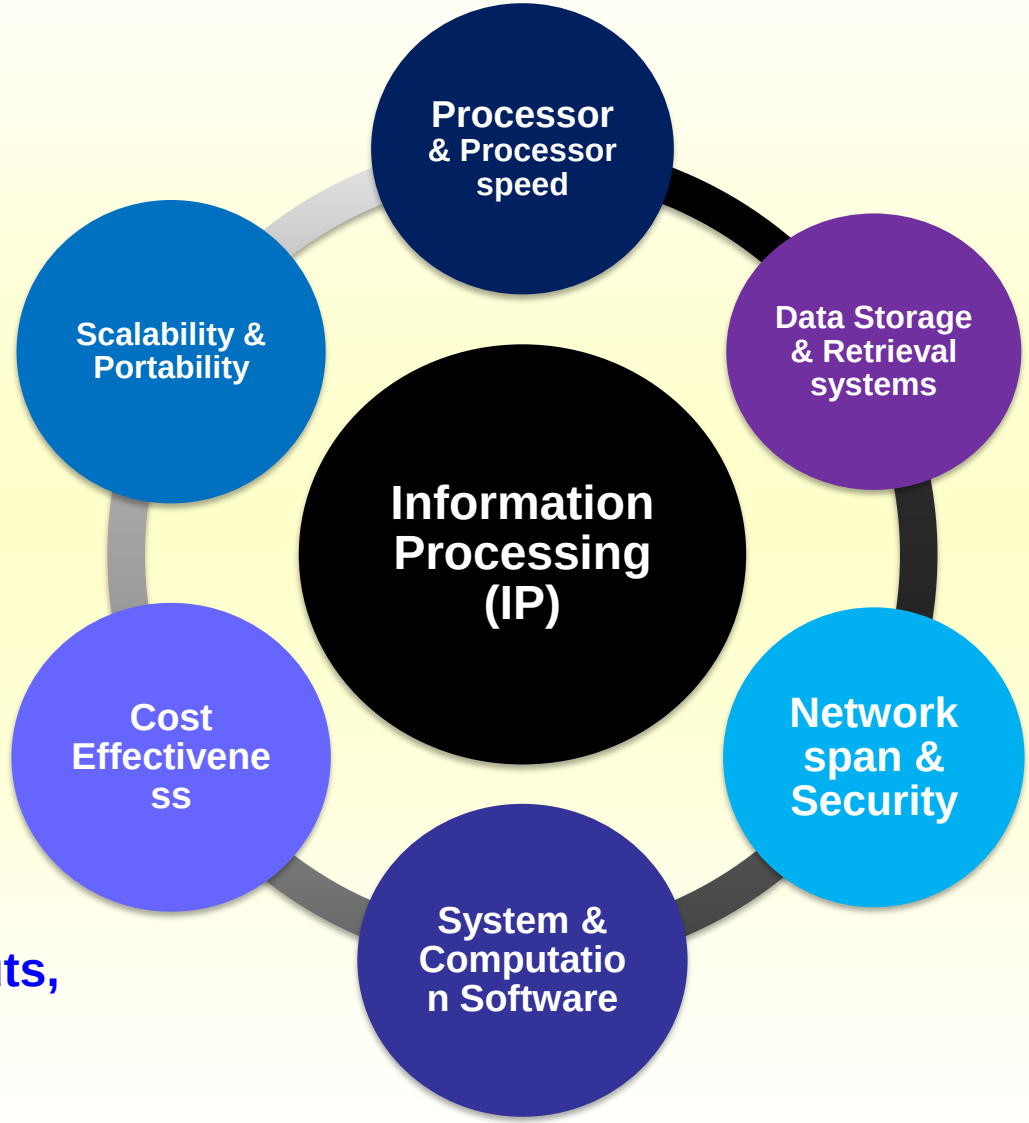
- Mokshagundam Visvesvaraya,an Indian engineer, scholar, statesman and the Diwan of Mysore
- Known as Father of modern Mysore State.
- Encouraged private investment in the industry during his tenure as Diwan of Mysore
- Chief engineer - construction of the Krishna Raja Sagara dam in Mandya district, flood protection system for the city of Hyderabad.
- Designed and patented a system of automatic weir water floodgates first installed in 1903 at the Khadakvasla Reservoir near Poona and at the Tigra Dam in Gwalior and the Krishna Raja Sagara (KRS) Dam in Mandya/Mysore, Karnataka
- Key role in the construction of the Krishna Raja Sagara Lake and dam in 1924.
- Recipient of Bharat Ratna Award, in 1955, honorary Membership of London Institution of Civil Engineers. & honorary doctoral degrees

INSIGHT TO FUTURISTIC TRENDS

INFORMATION TECHNOLOGY

1. Artificial intelligence , Deep Learning & Advanced Machine Learning
2. Virtual reality (VR) and augmented reality (AR)
3. Big data
4. Internet of Things (IOT)
5. Intelligent Apps

..... Many More

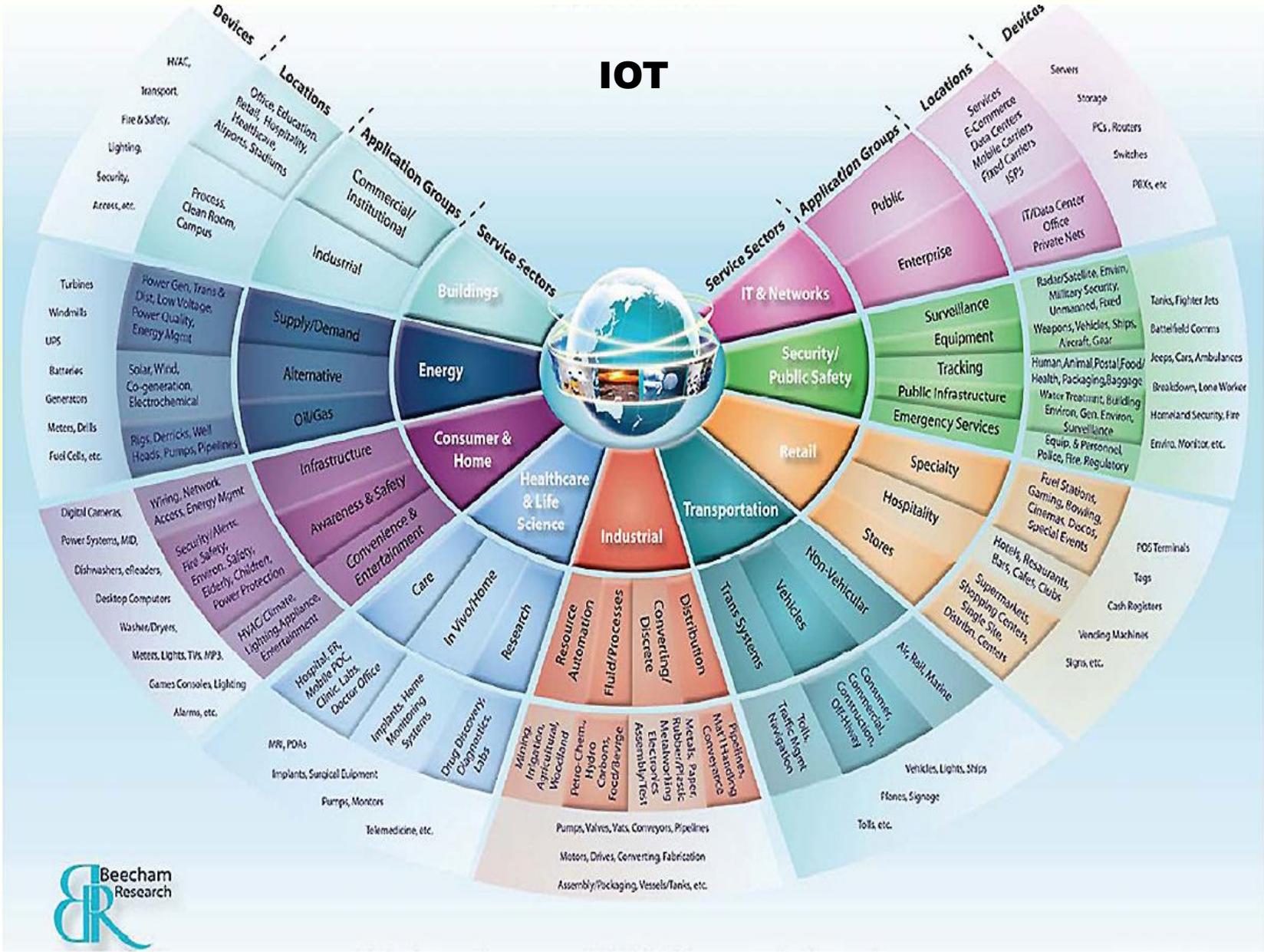


Societal Impact:

Automation, Real Feel, Real time inputs, Digital Assistants, Easy Accessibility, Secured Environment, Increased efficiency…

Massive Computer machines to Handy Mobiles

INSIGHT TO FUTURISTIC TRENDS



INSIGHT TO FUTURISTIC TRENDS

MEDICAL ENGINEERING

1. Nano Technology in Diagnosis
2. Artificial Intelligence - transforming healthcare into a quantifiable service and in drug research and clinical trials
3. Stemcell Revolution–cure for many diseases
4. Robotics – Accuracy with minimal fallacies
5. 3D Printing – Artificial Human Parts

..... Many More

Societal Impact:

Supporting clinical decision making & Route Cause analysis for Doctors , Guiding Clinical practices, E-Health records maintenance, Accurate Information,

Smart Healthcare

INSIGHT TO FUTURISTIC TRENDS

Artificial Intelligence in Clinics

Artificial Pancreas

Precision diagonosis

INSIGHT TO FUTURISTIC TRENDS

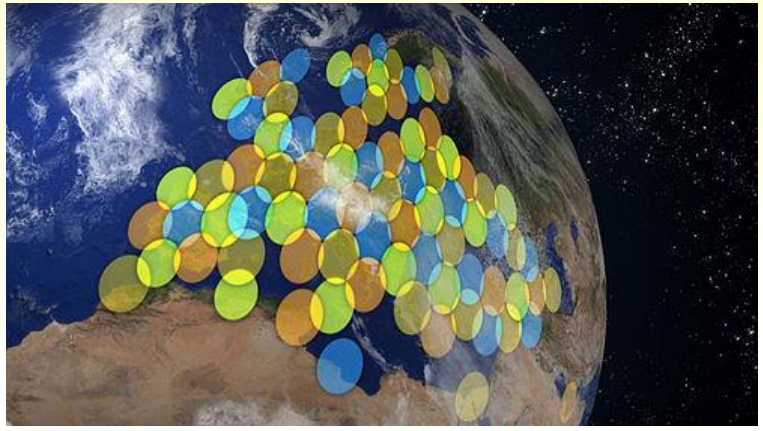
Communication - Massive Satellites to Nano Satellites

1. **High bandwidth Mobile Connectivity(HTS)**
2. **Bandwidth on Demand**
3. **DTH Connectivity – HD, 4K Transmission**
4. **Mobile Communication system**
5. **Internet via MEO Satellites**
   - **Ubiquitous reach of satellite &**
   - **Speed of fiber through ground gateways**
6. **O3b - Other 3 billion N/W**

..... Many More :

Middle-mile for Internet using MEO Satellites with Ka-band payloads

High Throughput Satellites



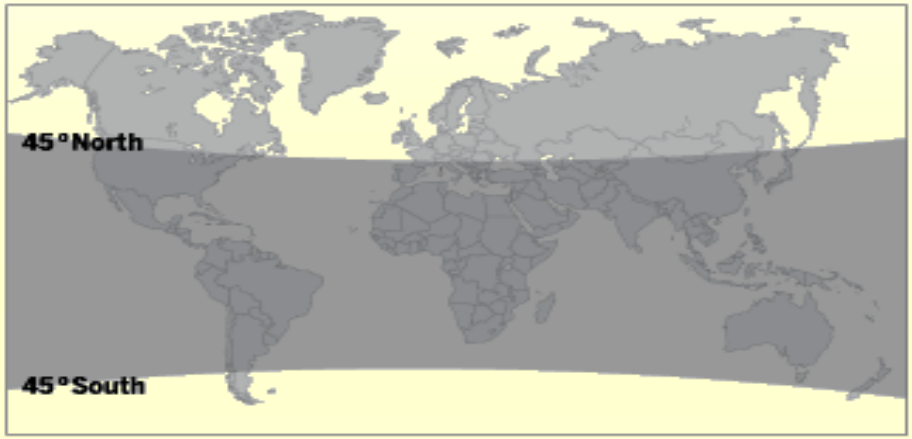
Future Trends – O3b : Other 3 billion N/W

O3b's planned new system

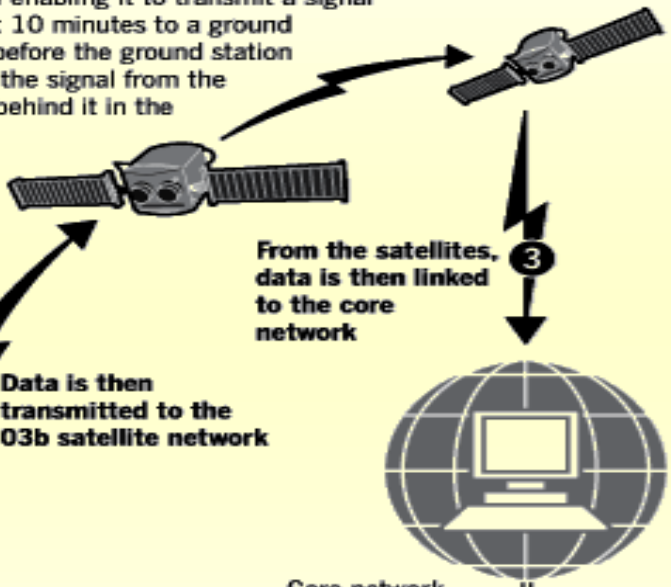
O3b is planning a constellation of 16 satellites providing high-speed, low-cost Internet connectivity to emerging markets in Asia, Africa, Latin America and the Middle East. Activation of the system is scheduled for late 2010

The planned network coverage

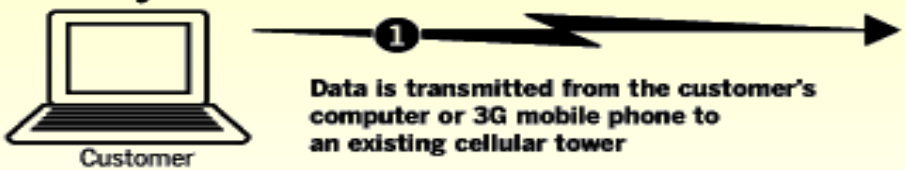
The array of 16 satellites will be able to cover all points between 45 degrees north of the equator and 45 degrees south

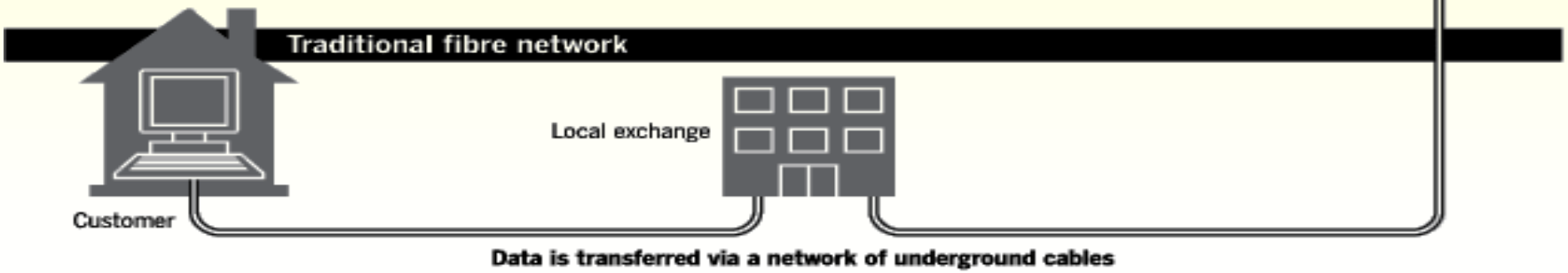


Satellite
Launched into orbit, it has swivelling antennae enabling it to transmit a signal for about 10 minutes to a ground station before the ground station picks up the signal from the satellite behind it in the queue



How the system works





INSIGHT TO FUTURISTIC TRENDS

Defense

1. Big data analytics - upsurge in cyber warfare
2. Additive manufacturing - By 2020, a majority of parts for aircraft engines are created
3. Improved communication - advances in mobile technology, allowing coalition forces to communicate seamlessly in real time.
4. Cyberspace -operationalized with capabilities spanning the electromagnetic spectrum. A debilitating code can be sent to a missile or submarine via radio, enabling a cyber-attack without traveling through the Internet.
5. Military Robots - capable of substituting soldiers

Military Robots

INSIGHT TO FUTURISTIC TRENDS

- Unmanned air vehicles;
- radars;
- space satellites.

- Mobility - the radars are mounted in off-road vehicles
- Ready in few minutes for operation

SOLDIER EQUIPMENT

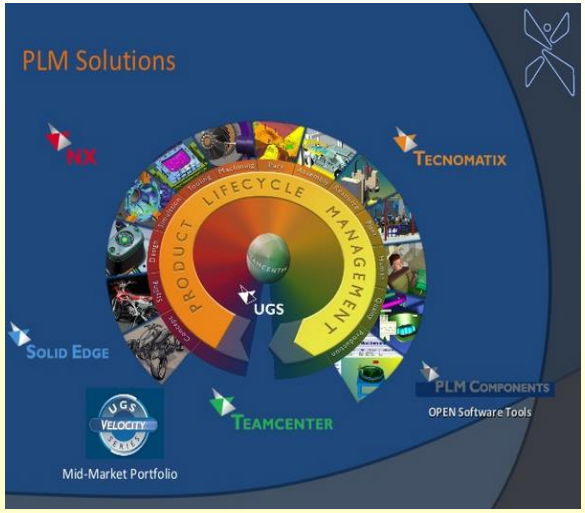
MILITARY TRAINING EQUIPMENT

INSIGHT TO FUTURISTIC TRENDS

Manufacturing Sector

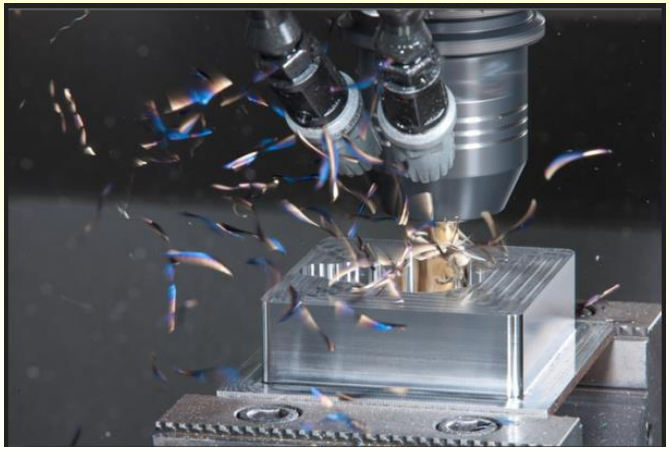
1. Automation – PLM
2. Robotics
3. HIGH SPEED MACHINING – Improved productivity
4. Virtual Engineering & Digital Manufacturing (Modeling & Simulation) – Better product quality , cost and production rampup
5. Digital manufacturing is a seamless end-to-end work flow

PLM



Virtual Engineering

High speed machining



Digital Manufacturing

INSIGHT TO FUTURISTIC TRENDS

Aerospace Sector

1. Structure – Design and Analysis Softwares
2. Advanced thermal control systems – Sophisticated Thermal Coolers
3. Propulsion systems – Electric propulsion, Nuclear Propulsion
4. Advanced Mechanisms – Light Weight & High strength materials, Composites
5. Adv material Developments – Composites and polymers
6. Craft-to-Craft Communication
7. The buzzing drones

The aerospace profession has expanded form hardware-based science, technology, and engineering, to systems, and even systems of systems-based engineering.

Craft-to-Craft Communication

Buzzing drones

INSIGHT TO FUTURISTIC TRENDS

Space Science

NEED

- Quest for Knowledge
- Origin of Life
- Deepened understanding of our Planet
- Outer Space Exploration & Beyond
- Life beyond Earth

BENEFITS

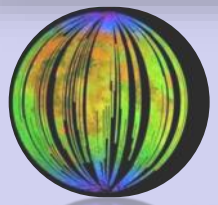
- Platform for New Technology Demonstration
- International Recognition in the space Arena
- Opportunities of International Cooperation
- National Growth at Large
- Inspiring young minds

Science Transforms World

INDIA'S CONTRIBUTIONS IN SPACE SCIENCE

CHANDRAYAAN-1

India's First mission to Moon With the participation of International Space Agencies



DISCOVERY OF WATER

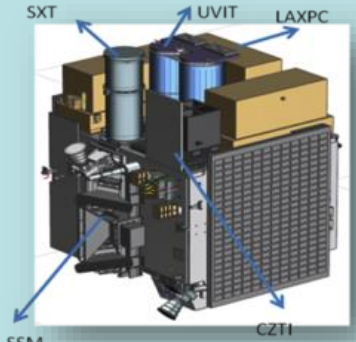
MARS ORBITER MISSION

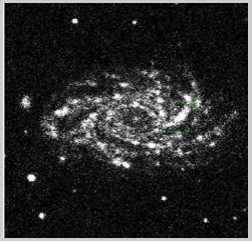
India's First mission to Mars Unique Achievement with many Firsts in Contemporary Mission to Mars

Mars Full Disc coverage

ASTROSAT

India's First multi wavelength space observatory mission Supported for participation Of Ext. Scientific Institutes



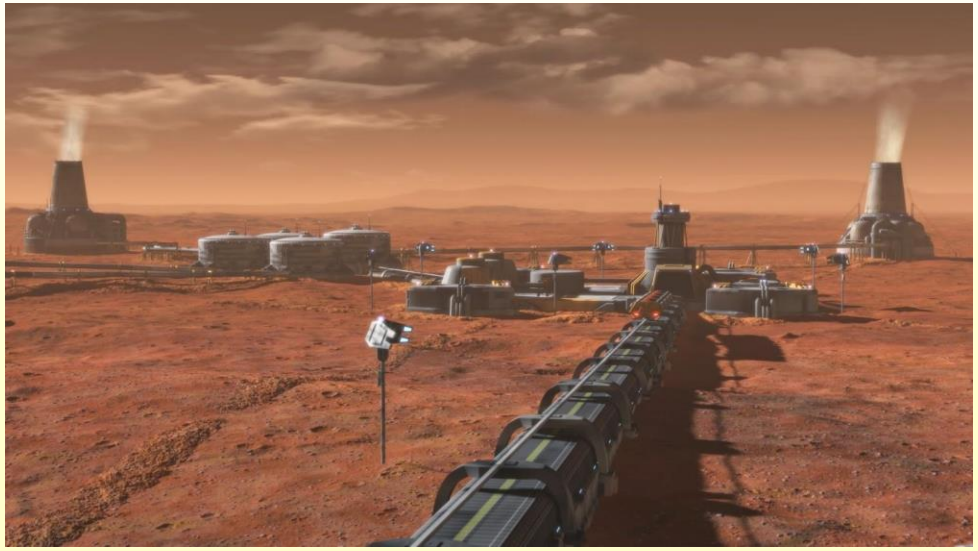


NUV image of NGC 2336 GALEX

NEAR FUTURE : CHANDRAYAAN-2 , ADITYA-L1, VENUS ORBITER, MOM-2…

Journey Continues

INSIGHT TO FUTURISTIC TRENDS



SPACE COLONISATION

SPACE TOURISM

INSIGHT TO FUTURISTIC TRENDS

Security Systems – Cyber Attacks

- Cyber Security - Major threat
- Computer-to-computer attack (Technology enabled warfare) - undermines the confidentiality, integrity or availability of a computer or information resident on it.

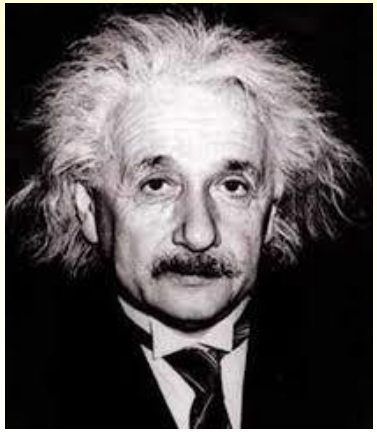
Cyber Attacks	Sources
Unauthorized Intrusions	Personal vendetta/ revenge
Domain Name Server Attacks	Thrill Seekers & Script Kiddies
Computer Worms	Terrorist Groups
Routing Operations	Commercial gains
Compound Attacks	Nation-States

Cyber attacks are increasing in volume, sophistication, and coordination

Cyber attacks are attracted to high-value targets

ROLE OF GENNEXT

ETHICS ?



All our exalted technological progress, civilization for that matter, is comparable to an axe in the hands of a pathological criminal.

- Albert Einstein

CONCLUSION

Pursuing Basic Science with great vigour

Science - for Societal Benefits and touching lives ; Not become divisive rather should bridge the gap

Protection of Environment : Minimize the damages caused to environment through decommissioning, environment recovery models

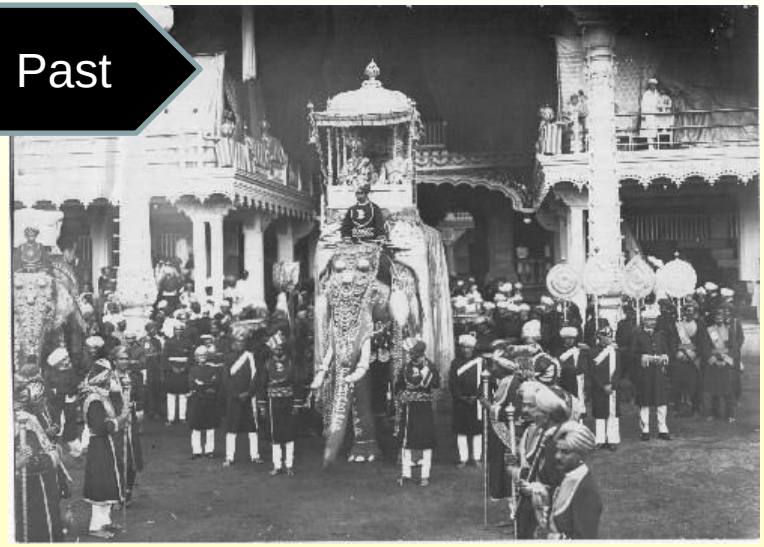
Traditions: Respect traditions that are still relevant , help people understand them better and not to reinvent the wheel

Invent, Innovate, Implement …..

There is no wealth bigger than knowledge
There is no virtue bigger than spreading knowledge

CONCLUSION

Past



Present

Mysore Dasara , Royal Festival
Celebrating
Victory of Truth over Evil

Join Hands in Using Technologies for empowering mankind in large

Thank You