



## CURRENT AFFAIRS SCIENCE REPORTER JAN-AUGUST 2012

### Symbols used :

\* marks indicate probable question apart from heading and subheading

† indicates not very important topic

^ indicates recently asked topic

### Decade of Innovation/Innovation Framework/Decade of Innovation: India @ Year 1

- DECADE OF INNOVATION (2010-2020)-Was announced by the PM Shri Manmohan Singh at the Indian Science Congress (Thiruvananthapuram) in 2010.
- The **objective** behind this is to develop an **'innovation eco-system'** in the country to stimulate innovations and to produce solutions for the societal needs in terms of healthcare, energy, urban infrastructure, water and transportation.
- For this purpose a **National Innovation Council\*** was set up by the PM, headed by Shri Sam Pitroda, to prepare a roadmap for this 'decade'.
- The government is also setting up a \$1-billion venture fund called **National Innovation Fund\*** to foster innovation at grassroots level.

### Decade of Innovation: India @ Year 1

- The 'Decade of Innovation: India @Year 1' conference held in New Delhi on the 16th and 17<sup>th</sup> of November 2011.
- **Dr Sam Pitroda\***, Chairman of the National Innovation Council and adviser to the PM On Public Information Infrastructure and Innovations, unveiled **innovation framework\***.

### Innovation Framework

- As outlined by Dr. Pitroda, the innovation framework seeks to create an ecosystem conducive to innovation by taking several measures.
- State level innovation councils are being set up and a billion dollar venture fund is being formed with only the seed money being supplied by the government.
- He also stressed on the need for more schools of design in India, for the industries and institutes of higher learning to collaborate so that innovations would be guided in the directions where most needed and for more investment in R&D.

### I3 Awards

- To recognise innovative talent and excellence.
- The i3 awards, where i3 stands for India Innovation Initiative, **recognises young innovators and helps them commercialize their idea.**
- Given during conference.

### Background:

- India ranks a mediocre 62<sup>nd</sup> [2012/INSEAD] on the **global innovation index\***.
- We are also just 17<sup>th</sup> on the list of number of patents granted by the USPTO, the United States Patents and Trademark Office and our performance is poorer than the other BRIC countries.

### National Innovation Council [NInC]

- Set up to prepare a road map for the Decade of Innovation–2010-2020.
- Headed by Shri Sam Pitroda.
- The Council has been given the mandate to evolve an Indian model of innovation focusing on inclusive growth and creating an appropriate eco–system conducive to fostering inclusive innovation.
- It will delineate appropriate policy initiatives within the government required to spur innovation. It will also promote the setting up of Sectoral Innovation Councils and State Innovation Councils.
- While encouraging all important sectors of the economy to innovate, it will take special efforts to facilitate innovation by micro small and medium enterprises.
- Innovation in public services delivery and encouraging multi-disciplinary and globally competitive approaches for innovations would be focused on by the Council.
- The NInC strategy focuses on five key parameters: **Platform; Inclusion; Eco-system; Drivers and Discourse.**

### Innovation Complexes

- To boost inventions, the Council of Scientific and Industrial Research will establish **12** innovation complexes across the country, with the first three coming up at Mumbai, Kolkata and Chennai.
- The CSIR Innovation Complexes (CIC) will house **scientists from various disciplines** with stress on designing commercial products based on indigenous technologies.

### Clusters Innovation Centers

- Partnership between NInC and CSIR.
- One of the key initiatives of NInC is to facilitate, promote, stimulate and strengthen innovation eco-systems across the country by creation of local Industry and University Innovation Clusters.
- **A cluster is a geographic grouping of institutions/firms in one industry which galvanises and strengthens the competitive advantage of that industry.**
- The innovation activities in the clusters identified by NInC would be galvanised around Cluster Innovation Centres (CICs).

- CSIR with its 37 laboratories, 3 units, 39 extension centres and its over 4500 scientists will provide human capital and know-how input to CICs.
- CSIR's involvement will also involve sharing their knowledge base and programs to boost the CICs, while CSIR will get new opportunities for enhanced MSME interaction to develop new research and innovations and fulfil the **CSIR-800 mission\***.
- **The CICs would be based on a public private partnership (PPP) model and would act as hubs for connecting various local and national stakeholders.**
- These CICs would then facilitate and drive innovation by connecting cluster needs to ideas, knowledge, technologies, labs and people.
- Some of the CICs may be located in the CSIR-innovation complexes.

### Extra vehicular activity

- Extra-vehicular activity (EVA) is any activity done by an astronaut or cosmonaut outside of a spacecraft beyond the Earth's appreciable atmosphere.
- The term most commonly applies to a spacewalk made outside a craft orbiting Earth (such as the International Space Station).

### Hospi Rimo

- It is a **Communication Assistance Robot**.
- The HOSPI-Rimo specifically helps those humans who are bedridden or just can't move about.
- It can help bedridden person to talk to others (Doctor, relative) via video chat.
- If a location near the target person is specified, the robot can autonomously move to that place, recognizing the surrounding environment and avoiding obstacles in the way.
- It can be remote controlled.
- Can deliver medicine to patient.

### Tessy Thomas

- "Missile Woman".
- Tessy Thomas is first-ever woman director of an Indian missile project.
- Heads project on **Agni V**- India's 1st ICBM-5000 Km range
- Since 1988, she has worked on Agni-series missiles and is also the strength behind the 2,000-km range Agni-II and 3,500-km range Agni-III missiles
- Along with her team successfully tested the new-generation Agni-IV missile on November 15 breaking new records for India by hitting a target 3,000 km away from the Balasore test range in the Orissa coast.
- This made **Agni-IV the first Indian missile to cross the equator** and hit a target in the southern hemisphere.

### Gender bias in Science

- A Swiss study showed that women had to be about 2.2 times more productive than their male counterparts to be as successful in securing financial support.
- Similar situation exist in almost all developed (UAS/CANADA etc) and developing countries

[Usage Note: You can quote in your answer to show gender bias in all areas]

### **Aditya**

- Aditya, India's solar mission, is a spacecraft to send by ISRO to study the solar corona.
- It will carry advanced solar coronagraph as one of its payload and will be placed in near earth orbit of 600 km.
- It will study the fundamental problems of coronal heating and other phenomenon taking place in earth's magnetosphere.

### **Juno**

- NASA's most ambitious mission and will attempt to discover the secrets behind the largest planet in the solar system, Jupiter.
- Five-year mission to the heart of the "King of the Planets", [August 5, 2011 -2016]
- Will arrive at Jupiter in 2016.
- Will travel roughly over a total distance of **2.8 billion kilometers** .
- Will study the planet's **core, atmosphere, powerful magnetic field and auroras**.
- The aim of the project is to learn more about how the solar system was created and unlock many of it secrets that have remained a mystery until now.
- Part of "New Frontiers program ".

#### **Background:**

- The New Frontiers program is a **series of space exploration missions** being conducted by NASA with the purpose of researching several of the Sun's planets including Jupiter, Venus, and the dwarf planet Pluto.
- NASA is encouraging both domestic and international scientists to submit mission proposals for the project.
- [**Mythology:** Juno is a daughter of Saturn and sister (but also the **wife**) of the chief god Jupiter and the mother of Mars and Vulcan]

### **MSL**

- Mars Science Laboratory (MSL) is a robotic space probe mission to Mars launched by NASA on November 26, 2011.
- The MSL mission has four main scientific goals:
  1. Investigation of the Martian climate,

2. Geology,
3. Whether Mars could ever have supported life
4. Investigation of the role of water.

### Curiosity

- MSL successfully landed Curiosity, a Mars rover, in Gale Crater on August 6, 2012
- The objectives of the Curiosity rover include investigating the possibility of life on Mars (its habitability), studying its climate and geology, and collecting data for any future manned mission to Mars.
- The rover carries a variety of scientific instruments designed by an international team.

### **Amitabha Ghosh**

- Indian origin **geologist(scientist)**
- **Chairman, Science Operations Working Group** -- Mission Operations at the **NASA Mars Exploration Rover Mission**
- has worked on **Vesta\*** -- an asteroid whose geological processes uncannily resemble those of Earth's -- and several generations of Mars missions, starting with the Pathfinder in 1997 and most recently, the Curiosity Rover.
- **was a member of the team that zeroed in on the Gale crater location where the car-sized rover "Curiosity" successfully landed .**

### **Dawn mission**

- Is a robotic NASA spacecraft tasked with the **exploration and study** of the asteroid **Vesta** and the dwarf planet **Ceres**, the two largest members of the asteroid belt.
- Dawn was the **first spacecraft to visit Vesta, and will be the first to visit Ceres.**
- Launched on September 27, 2007, Dawn entered orbit around Vesta on July 16, 2011, and will explore it until August 26, 2012.
- Thereafter, the spacecraft will head to Ceres, which it is scheduled to reach in February 2015.

### **Discovery program**

- Is a series of lower-cost, highly-focused American scientific space missions that are exploring the Solar System.
- It was founded in 1992.
- As a complement to NASA's larger "flagship" planetary science explorations, the Discovery Program goal is to achieve outstanding results by launching many smaller missions using fewer resources and shorter development times.
- **Moon Mineralogy Mapper, placed on board the ISRO's Chandrayaan orbiter, was part of this program.**

## Chandrayan 2

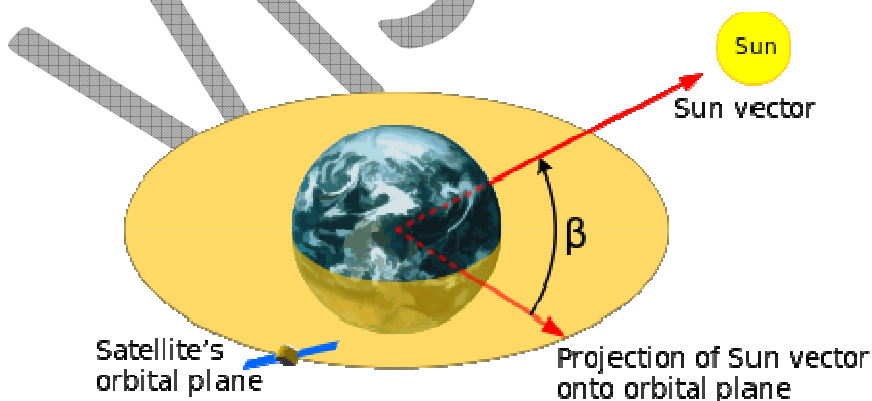
- Chandrayaan 2 is the **second lunar mission** planned by ISRO.
- It will have an **orbiter, a lander and a rover**.
- The Russian Federal Space Agency (RKA) will provide the lander, the rest will be developed indigenously.
- The orbiter will orbit the moon at an altitude of around 200 km. The rover will roam the surface, collect samples of soil or rocks, analyze them with a spectrometer and send the data to the orbiter to be relayed back to Earth. The orbiter itself will also carry some scientific instruments that will map the elements present in the moon's surface and look for water.

## Kepler 22b

- Is an extrasolar planet orbiting star Kepler-22.
- Dubbed most **earthlike planet**.
- It was discovered by NASA's Kepler Space Telescope and is the first known transiting planet to orbit within the **habitable zone** of a Sun-like star.
- It is located 600 light years away from Earth in the constellation of Cygnus.

## Beta angle/solar beta angle

- The beta angle is a measurement that is used most notably in spaceflight.
- The beta angle determines the percentage of time an object such as a spacecraft in low Earth orbit (LEO) spends in direct sunlight, absorbing solar energy.
- Beta angle is defined as the angle between the orbit plane and the vector from the sun (which direction the sun is shining from).
- The satellite heats up when it is facing the sun or is in the sunlight and excess sunlight can overheat the satellite and cause damage.
- The amount of sunlight received by the satellite depends on the solar beta angle.



### **Immune privileged sites**

- Certain sites in our body are able to tolerate the introduction of **antigens** without eliciting an immune response.
- This is called "**immune privilege**" and these sites are called **immune privileged sites**.

Example- Eye, Uterus, testis, brain

[Note: This is the reason why Eye transplant has low rejection compare to liver]

### **Devsthal telescope**

- A 130-cm optical telescope at Devasthal, Nainital installed by Aryabhata Research Institute of Observational-Sciences (ARIES), Nainital.
- Support by Belgium government
- Devasthal telescope will also act as a complimentary platform to the Indian Space Research Organization's Astrosat satellite, schedule to be launched in 2012. Astrosat will be India's first dedicated astronomy satellite.

### **VVER 1000**

- Are the 3<sup>rd</sup> generation reactors given by Russia to India to set up at Koodankulam, Tamilnadu.
- They are basically **Pressurised water reactors**. [not heavy water]
- Water is used as both moderator and coolant
- Fuel is low enriched Uranium
- Can generate 440 MW to 1200 MW
- Currently russia is providing to kudankulam 2 x1000 MW and plans to provide 4 x1200 MW reactors

#### **Safety features**

- Core catcher at base of reactor to trap molten fuel and prevent it from flowing into soil
- Advanced cooling system

### **Why DOCTORS generally Prescribe a combination of antibiotics, antacids and multi-vitamin tablet**

- For most of the common bacterial infections.
- The main reason behind this is that oral administration of antibiotics affects not only the disease causing microorganisms, but also increases the acidity of the stomach, causes disruption of intestinal flora, and suppresses the B complex vitamin synthesizing bacteria present in the mucosa of stomach and intestine.

### Pheresis or Apheresis / Plasmapheresis

- In many cases patients don't need full transfusion of blood but instead part of it.
- For example in cases of Dengue it is the platelet count in the patient that goes down and the patient recovers as soon as he is transfused with fresh blood platelets.
- This technique is a special kind of blood donation where, for example, platelet or a single blood component is separated by a machine and the rest of the blood is returned to the donor's body.

#### **Process:**

- The platelets are donated and the RBC and plasma is returned to the donor. This process just takes one needle stick and approximately 90-120 minutes.
- The same method can be used to collect apheresis RBC—red cells are collected while plasma and platelets are returned to the donor.

#### **Benefits**

- Platelets can be taken about 24 times in a year by a single donor whereas the same donor can donate whole blood once in three months only as it takes longer to replace.
- One pheresis donor can give concentrated platelets which otherwise would have required about five or six whole blood donors.

### Inculcating Scientific Temper into National Consciousness

(Usage note: can be used in essay, polity and social issues.)

- The Indian missile programme recently notched up an impressive record by firing the Agni-IV missile at a target 3,000 kilometres away. The country's space programme, meanwhile, has set its sights on landing an Indian on the moon possibly by 2020.
- But, cut to a village in Sangli, Maharashtra and you find villagers following a bizarre ritual—throwing infants down into a 50-foot deep well with the belief that it would help increase the life of the kids! Meanwhile, in a remote village in Andhra Pradesh, somewhere near Hyderabad, a piglet that happened to stray into the precincts of a temple is being worshipped as a divine incarnation. In other parts of the country, women are burnt on suspicion of being witches and children are killed on the advice of tantriks promising good fortune and wealth.
- **Is it acceptable for a country to have pockets of brilliance while a major part of its populace continues to wallow in ignorance and superstitious beliefs?** Why have our efforts at inculcating scientific temper not given the desired results even after 64 years of independence? What, after all, is scientific temper? Can it be taught and inculcated later in life?
- These and many other issues were thrashed out at the International Conference on Science Communication for Scientific Temper, recently held in New Delhi during 10-12 February 2012. The three-day international conference was a joint effort of the CSIR-National Institute of Science Communication And Information Resources (NISCAIR), Vigyan Prasar and the National Council of Science & Technology Communication (NCSTC), Department of Science & Technology.



## Notion of Scientific Temper

- In a session “History and Notion of Scientific Temper”, Dr Dinesh Mohan, who played a part in the drafting of the 1981 ‘Scientific Temper Statement’, said that the scientific temper statement preached the spirit of enquiry. However, he said that our society had today become more obscurantist. What we do or not do is all governed by our political ideology. Today, we can’t even watch a movie, see a painting, an exhibition etc. that a section of people doesn’t like. Even highly developed and scientifically advanced societies are killing thousands of people without listening to their point of view.

## Resolutions Adopted at the “International Conference on Science Communication for Scientific Temper”

- Passing through the twists and turns of intellectual debates and empirical studies, during the past 30 years, the research on public understanding of science and science communication has matured. The house strongly feels that Indian experts and agencies should put together intellectual and material resources and take the lead to initiate focussed research on ‘Scientific Temper’.
- With the advent of new media and proliferation of science movements, the mass base for communicating science has enlarged many folds. Even the marginalised sections of stratified societies, who did not constitute the audience for science communication during the previous century, today, are being drawn into various debates on scientific issues. The house recognises that all the efforts made to communicate science, eventually, are directed towards spreading ‘Scientific Temper’ among the publics. However, the house also noted that a disjuncture, between the research outcomes and actual practice of science communication, exists and there is an urgent need to bridge the gap.

## RECOMMENDATIONS

### International Level

- Scientific temper as a notion cuts across traditional boundaries of natural sciences and includes disciplines such as arts, philosophy, and literature. Therefore, a trans-disciplinary approach to scientific temper is required.
- There is an urgent need to establish synergy between research and actual communication of science. For this the level of discourse has to shift from ‘scientific literacy’/‘public understanding of science’/‘public engagement of science’ to creation of scientific temper among the publics at large.
- International community of experts should make concerted efforts to initiate and encourage scholars in developing countries to work on ‘scientific temper’.
- Scholars and institutions in fast developing economies, such as India, China, South Africa, Brazil and Argentina, should deepen their cooperation and may institutionalise it through memorandum of understanding.
- In order to facilitate further research, a three-pronged strategy suggested earlier must be followed: inventory and compile existing databases; make these available on Open Access on Web; and create an inclusive network of scholars and communicators working in the areas of science communication, public understanding of science and science education.
- The efforts to communicate science through traditional and new media must be intensified and communicating science should be considered as ‘public good’. Governments, especially in developing

countries, must take the responsibility of running and financially supporting science communication activities.

- The transmitter model of communication should be shunned and public should not be considered as ignorant-scientifically illiterate-clean slate, on which any scientific information can be written. Instead, all channels of communication, including science museums, extension centres, TV and radio channels must take the cultural-worldview of the target audience into cognisance.
- Science Movements led by the Civil Society organisation, at times, have divergent views on science and technology policies formulated by the governments. It is recommended that efficient channels for continuing dialogue between the two must be opened.
- Of late, there is a spurt in the anti-science and extra-science propaganda the world over, at times, specifically directed to spread unfounded fear among the masses. Scholars have a social responsibility to lobby and pressurise the Governments to formulate strict rules to deal with such propaganda.

#### **National Level**

- The house suggests that every country should strive for adoption of implementable government policies to spread scientific temper among its citizens specifically in the local languages.
- The house reaffirmed the earlier recommendation to establish research/teaching institutes dedicated to the furtherance of scientific temper having strong linkages with other cognate institutes/disciplines.
- Since scientific temper is a continually changing notion—in space and time—regular national and international consultations to review the developments are required. Efforts should be made to institutionalise these deliberations and the conclusions should be widely publicised.
- Regulatory bodies monitoring and auditing mass media such as print, radio and television should issue guidelines to create an atmosphere where individual citizens could perform their fundamental duties of spreading scientific temper, humanism, secular values and spirit of inquiry.
- The house noted that no national level study of 'scientific temper' has been conducted. It is strongly recommended that apex institutions in these countries must come together to carry out studies to measure national 'scientific temper' levels.
- In addition to common minimum indicators, region/country and culture/theme specific indicators of 'scientific temper' should also be developed and shared with other scholars for their benefit.
- We believe that spreading 'scientific temper' would strengthen the democratic spirit among the people to enable them to articulate their entitlements based on rational scientific temper.
- Specific efforts should be made to develop tools and materials to spread scientific temper.
- To promote scientific temper at the grass-root level, a web-based database should be created to document science communication activities—both successful as well as failures. Incentives and recognition to successful science communicators should be institutionalised.
- Each country should have a dedicated TV channel, exclusively to communicate science and a mechanism should be created to share resources without IPR restrictions.

#### **Brief background**

- Science is as old as the Universe itself. Understanding 'Science' can be attributed to the 'Sixth' sense. However, communication of science lagged behind even after language developed. Collective progress



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-Amrutesh Aurangabadkar (AIR - 10, CSE 2011)

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