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Manthan is a quarterly magazine published by BiharBrains, an international Forum of educated people of Bihar with the objectives of sharing ideas, knowledge and achievements which can be benefited to the scientific and non-scientific community.

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Editor's Desk

India is progressing fast and if the this pace of development continues, India may become super power in 2020. This is vision of our beloved president ,popularly known as Poeple's President Dr. A.P.J Kalam who himself involved into pioneering S&T in India ; who made history as missile man of India and was brain child of Nag , Prithvi Akash, Trishul, Agni and several other projects being heads of around 50 R&D Institutes; who made India a nuclear power and was leader during Shakti-98; who gave ***mantra for educated politicians*** *(unfortunately not approved by the parliament) to rule over the country; who when gave little smile, all children's of India bestowed exhilarating love and the last but not the least he is who gave vision for the development of Bihar and stated that the development of Bihar leads to the development of the nation . This fourth issue of Manthan covered has special article on him who is now our outgoing President of India.*

Continuing Vision of 2020 for becoming strong India with a tag of super power in the world, we covered article on the areas where India is Booming & Bubbling and showing its standard to the world. Also in this section, the target of transforming Bihar from bad phases to good phases got major attention as the development of this state leads the development of the nation and dream of Super power in 2020 will be possible if state like Bihar, UP, Chhatisgarh, MP, Jharkhand, Orissa improves its human index report and take active & leading role in economy of the nation . I do hope this section will be liked by the fellow readers.

In S&T section, Electronics and its application into chip design technology (particularly Indian fabrication industry) and re-use of waste electronics equipment may find place in the minds of the readers.

The other section of Manthan for this issue is also almost remains same as that of earlier issues.

We solicit your reactions, comments and suggestions in the mailbox and expect that with your help and support in future this magazine will grow into a versatile platform.

For details you are free to visit our website www.bbmanthan.info .

Bibhuti Bikramaditya

Scientists prove Meditation Increases Brain's Processing Capacity

Dr. Ravi Shankar, Bangalore, India

Meditation is not a new thing to India. Being the land of oldest civilizations, rich in heritage and ancient, India conceals many truths and facts of life which westerners first rejected due to huge gap between their time, history of our science and it's maintenance, giving large disbelief in vedic practices and vedic science, fully discouraged by rulers and governments of modern India.

But every now and then, prestigious research institutions are coming with results validating the vedic practices. Addition to this is recent scientific experiment results coming in strong support of Vipassana meditation enhancing the brain processing capacity. The work has been reported recently by Rachel Jones, in a prestigious scientific journal, Plos Biology, May 2007 edition.

Vipassana is a vedic meditation over self where the subject concentrates upon the body and soul system and senses of weightlessness and nullity is generated. This method of meditation was rediscovered many times in many other forms in India, out of which Budhdhist methodology got most popularity and has become synonymous to vipassana meditation in present time.

The neural system of body works under the influence of constant inputs generating sensory responses, called stimulus. The whole process is carried on by the voltage differences generated across the cell membranes, where the cell membrane behaves like a capacitor and metal ions like sodium-potassium, Magnesium-calcium and chlorides etc maintain the electric potential difference across the two sides of cell membrane's at equilibrium. Whenever there is a disturbance in that equilibrium a sensation is felt through stimulus.

Our attention to objects are matter of visual stimuli, over which this group worked. Every object which we see with attention, induces stimulus in our brain. This allocates processing space in our brain to process and infer the visualization of the object. The time consumed for this whole process is called “Attentional Blink”, a phase during which, if the observing brain is exposed to another consecutive unrelated stimulus, becomes unable to process and recognize it, due to occupied processors of brain. This is the cause behind our attention, learning capacity and multitasking.

This group of scientists proved that by performing vipassana meditation, the brain reduces the blink period and becomes more attentive. The blink has nothing to do with the structure and architecture of brain and it can be enhanced with practice.

Three different groups were prepared. One group underwent extensive vipassana training for 3 months(10-12 hours) while another group of novice learners (armatures) practiced vipassana only for 20 minutes per day, while the third group was of people who did not practice vipassana or any meditation. Patient's brain's waveform during learning or observation process was measured, which is directly proportional to the amount of processors of brain involved in processing. This was noticed that blink period was reduced in meditating people and they were able to detect targets in the period which was earlier a blink period for them.

This finding was further corroborated with study over event related potentials—electrical changes associated with neural responses to sensory stimuli or cognitive tasks, which can be recorded through the scalp, for memory allocation. When event-related potentials are recorded from subjects during the attentional blink task, a noticeable electrical change—called the P3b—is associated with the appearance of the first target. This event is believed to reflect the allocation of resources to the target.
The P3b was smaller for the group trained for three months, means the potential consumed was lower and was utlised to detect second target in the same time of observations.

Finally a correlation study was done between the two different modules of the study at individual level too. The scientists found that individuals for whom the P3b potential was low were very able to learn more than one exercises withing the same blink time. There was a linear relationship between these two analyses, again suggesting

that meditation reduces the resource consumption and frees them for computation of other tasks by the brain to gain stimulus. Larger attention blinks are due to more allocation of processing space by the brain which reduces the capacity to do multitasking.

So, what our vedic practitioners did is now being proved scientifically. We can say that the problem is with the pace of science to catch up with spirituality which is the advanced version of science and truth and becomes general when it's dealt successfully by a science. Einstein proved that things can move faster than light but still for us vision is defined by only those 7 colors sensations and fit the popular phrase: Seeing is believing!

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Indian Chip Design Industry

Bibhuti Bikramaditya, Seoul, South Korea

Abstract: *Gone are the days when the chip design and its fabrication were baby of only US markets. In 1995 when it was introduced to the whole world by US Defense dept, tectonic shifts have started showing its presence in the high-technology world. Chip manufacturing activities moved out of US markets in form of Asian foundries, and now the back end, verification and design services have also begun their eastward march. The center of gravity of the high-tech industry is slowly but surely moving eastwards, opening the doorway to huge opportunities for Asian nations particularly India.*

Though in India ,manufacturing chip is still dream but certainly as far as chip design activity is concern, Indian chip designers has been regarded as expert and going to be leader in R& D activity. Till today, the bulk of the chip design activity in India is mainly focused on ASICs and FPGAs, processor based SOCs are proliferating now.

The estimates says that the types of IC design is being done in India in today is based on following

- **ASIC : 40%**
- **SOC : 20%**
- **Structured ASIC : 5%**
- **Gate Arrays : 10%**
- **CPLD/FPGA : 15%**
- **Full custom : 10%**

From the end product prospective, most chip design in India is targeted at

- **Communication : 30%**
- **Consumer Application: 40%**
- **Computer peripheral : 20%**
- **Other Industrial Application : 10%**

Approximately 50 percent of the design activities in India are carried out in the areas of wireless and wired communications. Consumer electronics represents the next-largest application. Designs at geometries of 90 nanometers and larger comprise approximately 90 percent of the total design activities in India.

While captive design centers increasingly are engaged in high-end R&D projects intended to serve the needs of the global parent company, the role of IDHs in India is rapidly growing as these companies provide flexible business models for design engagement.

Most of the IDHs in India are involved primarily in front-end design work, providing testing and verification-level services. However, a few of these companies also are involved in end-to-end design activities, ranging from specification to tape outs.

Overview of major players of Indian Chip design industry:

As per estimates, more than 100 good companies are working in the ASIC/FPGA design and more than 150 companies are working in embedded chip design and development spread over all over India particularly in the major cities like Bangalore, National Capital Region, NCR (Delhi, NOIDA, and Gurgaon), Pune, Hyderabad, Chennai, Mumbai etc. In addition to this Chip design industry is also gaining momentum in Kolkata, Chandigarh, and Mysore, Vishakhapattnam, Coimbatore and Bhubaneshwar cities of India. The following major companies have played major role in this industry, these are

1. **Texas Instruments** : When Texas Instruments became the first multinational technology company to set up a design base in India In a period of 20 years Texas Instruments (TI) has erected more than two design centers—over two third of the engineers at these centers are involved in designing integrated chips. But much more important is the fact that virtually every TI design worldwide uses some design proto-typed in India. The centre delivered the world's first single-chip solution for high-end modems.

Three years ago, TI India opened centers for designing 3 G wireless chipsets and LAN Chipsets. From being an outpost experiment 20 years ago, Texas Instruments today drives research at TI, outside the US.

2. **Intel Corporation**: Intel, the world's largest microprocessor player, with a stranglehold in the PC, notebook and server market began its tryst with India in 1998. It started out with a pool of 3000 engineers but is now in the process of increasing its headcount three-fold within the next three years. Engineers at Intel's centre in Bangalore started out by being involved in system engineering and software design. Now they've moved up the value chain and are responsible for development of next generation microprocessors, semiconductors and memory technologies.

3. **Cadence Design Systems**: Cadence, which is a world leader in design automation, is putting $50 million into its Indian operations.

4. **AMD**: Famous Chip maker Advanced Micro Devices established a chip design center in Bangalore, India, for use in next-generation designs. It has plans to invest approximately $5 million over the next three years to establish the center and ramp up operations, which will initially employ 40 engineers but could be expanded to as many as 120 by the end of 2005. The center will be known as the AMD India Engineering Centre Private Limited.

5. **Motorola:** Motorola is relocating its design house from Singapore. Hongkong, Taiwan to India .Micro chip is its product widely used in the market.

6. **Mentor Graphics**: The automation firm, Mentor Graphics, plans to double its engineer man-count in three years.

7. **ST Microelectronics**: The world's third-biggest microchip manufacturer recently added a new wing with a built-up area of 70,000 square feet at its advanced chip design centre in Noida, on the outskirts of Delhi, to accommodate 550 additional software engineers who work on chip design, embedded software and also provide software service backup for STM's global clients. The designs that are finalized go into proto-typing chips, which are mass produced in fabrication centers like Singapore and Taiwan, before being fitted into a range of electronic goodies ranging from mobile phones, DVD payers, mart cards to personal digital assistants, etc.

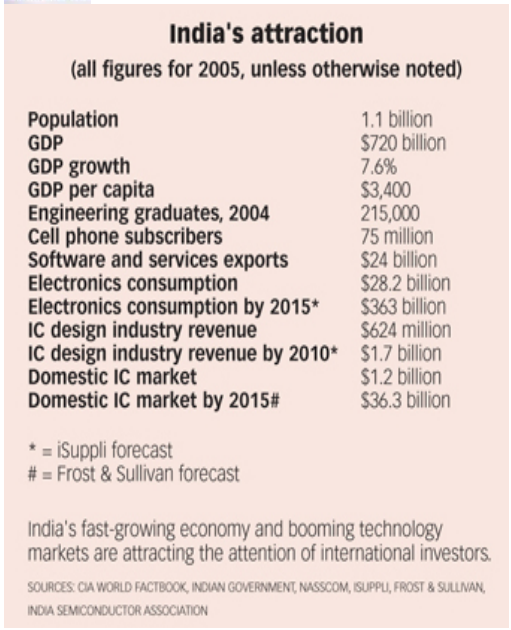
Company	Investments/people	Design
Texas Instruments	2 new centres, Bangalore	3G wireless chipsets/LAN chipsets
Motorola	Relocating chip design units in Singapore, Hong Kong, Taiwan to India	Microchip
Alliance Semiconductor	$50 million fresh investments at Hyderabad, Bangalore; increase staff from 150 to 300	Semi-conductor design
Intel	$41 million fresh investments in Bangalore tripling headcount from 1000-300	Hw and sw design, next gereration micro-processors, memory technologies
STMicroelectronics	$100 fresh investments; triple headcount to 3000	Chips for consumer goods
AMD	Bangalore centre; increase headcount from 50 to 120 by 2005	Microprocessor development
Agilent Technologies	Design centre in Gurgaon; 50 engineers by year end	ASIC development

Source: The Economist Intelligence Unit, Business India Intelligence Report, June 2004

Other leading names are IBM Global Services, Lucent Technologies, Philips Semiconductors, Texas Instruments, Motorola India, Cypress Semiconductors, HCL Technologies, ST Microelectronics, GE India, Bi Square Consultants DCM Data Systems, Artech Information Systems, Alliance Semiconductors, Analog Devices, Core El Logic

Business Growth: Present & Future

The market is enormous. The ASIC design services market globally is estimated at $50 billion in 2006, while the embedded software market size is put at $25 billion. The fabless trend continues to soar and the US Fabless Semiconductor Association predicts that the market shares of fables companies will jump from just over 10 percent today to 50 percent by 2010. Additionally, there is the IP design market opportunity.



India's attraction

(all figures for 2005, unless otherwise noted)

Population	1.1 billion
GDP	$720 billion
GDP growth	7.6%
GDP per capita	$3,400
Engineering graduates, 2004	215,000
Cell phone subscribers	75 million
Software and services exports	$24 billion
Electronics consumption	$28.2 billion
Electronics consumption by 2015*	$363 billion
IC design industry revenue	$624 million
IC design industry revenue by 2010*	$1.7 billion
Domestic IC market	$1.2 billion
Domestic IC market by 2015#	$36.3 billion

* = iSuppli forecast
# = Frost & Sullivan forecast

India's fast-growing economy and booming technology markets are attracting the attention of international investors.

SOURCES: CIA WORLD FACTBOOK, INDIAN GOVERNMENT, NASSCOM, ISUPPLI, FROST & SULLIVAN, INDIA SEMICONDUCTOR ASSOCIATION

If you go whole hog of the business of the Indian chip industry, we may summarize that Indian chip industries are mainly in the field of design & services or work at the subsidiaries of the global chip companies particularly in the field of hardware services and board manufacturing, system integrators, software IP firms. Industry leaders believe India is becoming a 'VLSI design store' with a strong presence in Intellectual Property development, integration and embedded software services.

The total design revenues of the sector stands at $3.5 billion in 2005 and is expected to grow almost 15 times by 2015.

According to a market research firm, in 2003 the total electronics market in India was estimated to be $12.3 billion. The market is attracting very serious attention—both from domestic and international players. It is estimated to touch revenues of $800 million for ASIC services while embedded software expected to reach $1500 million.

According to government and industry estimates, India's electronics hardware market could grow from $28 billion in 2005 to $363 billion by 2015. The government is expected to take an equity stake in a $3 billion Hyderabad chip factory with start-up SemIndia, which has a partnership with AMD.

iSupply Prediction: India's Integrated Circuit (IC) design industry is booming, with market revenue expected to reach US$2.1 billion by 2010, rising at a Compound Annual Growth Rate (CAGR) of 29 percent, up from $596 million in 2005, iSuppli is predicting
By 2015, the design market in India will grow to 15 times the size it is today and the market value of the design industry will be 1% of the nation's gross domestic product (GDP), according to researcher iSuppli.

As these Indian companies continue to mature in terms of experience and capabilities, iSuppli projects that their contribution to the total market will grow to 49 percent by 2010, up from 35 percent in 2005.

Effect of IC Industry when we get fab lab in India

The Semiconductor Industry Association (SIA) reported that global semiconductor sales set a new monthly record for the fourth consecutive month. Worldwide sales of semiconductors reached $21.9 billion in October, an increase of 9.2 percent from October of 2005 when sales were $20.1 billion. Sales increased by 2.5 percent from the $21.4 billion reported in September 2006.

"Sales of personal computers, cell phones, and MP3 players continued to be strong, reflecting the start of the holiday season," said SIA President George Scalise. "The year-on-year increase in global semiconductor sales was led by robust increases in sales of DRAMs – up by 42 percent from a year ago – and DSPs – up by 11 percent from October 2005. Sales of microprocessors increased by 8 percent sequentially, but declined by 3 percent from a year ago."

A survey Frost & Sullivan conducted for ISA found that an in-country commercial fab would lead to the boost of consumer electronics in India, taking the country's global share of the electronics industry from 2.8% currently to 11% by 2015.

As the industry undertakes these true SOC designs, the gate counts will rapidly increase to 10M and greater. These designs will require 90/65 nanometer geometries to meet dies size and cost targets. It will also necessitate the need for more custom back-end development (physical design services) as well as mixed-signal technologies.

Fab lab does not exist in India: why?

1. Huge Fabrication lab cost:

The actual problem is that quality talent with the right skills is becoming scarce. The skills required are in vertical domains (DSP, telecom etc.) along with in-depth understanding of chip design challenges like designing for high speed, low power, small size, handling large complexities, accounting for deep sub-micron effects like signal integrity. This is assuming that these engineers come with basic microelectronics skills including an understanding of semiconductors and design basics like language-based design methodologies. Exposure to contemporary design tools is also important.

2. Design Incompetence, Probably India is not prepared

According to Mr Girish of Texas Instruments, "It's not feasible for many small Indian companies to make sustained investments for a long period of time, which is required for product development (including the area of chips design/manufacture). I don't think we can do that now. Also, to get into full-scale manufacturing, the government should also take some efforts. It has to take a decision to shift manufacturing units to smaller towns instead of concentrating on the metros."

ISA: The latest is the ISA, or Indian Semiconductor Association, whose aim is to promote India as a destination for commercial chip fabs and develop "clusters" of fabs that the world can come and use. The chip fabs, says Poornima Shenoy, president of the year-old outfit based in Bangalore, will "encourage local manufacturers to become important worldwide players in electronics." The association has 104 members, but they are all chip design houses including heavy hitter Broadcom. The group is hoping that manufacturing will happen and those new players will participate.

Efforts to bring Fab labs in India

Nasscom: Just about everyone has heard of Nasscom, the powerful Indian software industry association. Now other groups are popping up along India's technology corridor to try and mimic Nasscom's success in promoting the business of its members.

Major steps involved in VLSI Chip Fabrication

Step 1: Silicon wafer is heated in an oxygen rich furnace so that a layer of silicon oxide is formed on the top surface of wafer.

Step 2: A thin coating of photographic emulsion is applied over the oxidised surface of the wafer. This is followed by a dry and bake stage so that the photographic emulsion also known as photo resist hardens.

Step 3: At this stage the working photomask is generated from the VLSI Design.

Through a chain of process, optical reticle is generated that is further processed to generate working photomasks. These masks are used in wafer fabrication for selective etching of silicon wafer. Photomask is aligned with the wafer and is exposed to light so that photo resist surface of the wafer gets selectively exposed and developed as per the photo mask design.

Step 4: A highly sophisticated chemical process selectively etches the surface of the wafer leaving behind the parts that are masked by the resist material. When the required etch depth is achieved the wafer is stripped of the resist and washed clean. This process is repeated for successive masking layers.

Step 5: The complete Integrated Circuit is made up of the transistors. Now the transistors have to be formed on the silicon wafer. A process known as doping achieves this. By doping the conduction or resistance, silicon wafer is modified so that transistors can be formed.

Step 6: In order to produce a functional circuit, the transistors formed by doping are to be interconnected. This is achieved by depositing fine wire traces made from aluminum or copper to connect up the transistors in a correct way.

Step 7: The processed wafer goes for testing as per the test program where each die on a wafer is probed and marked as good or bad die.

Step 8: The wafer is scribed and broken into dice. Good dice go for packaging.

ISA's dream is to develop a physical fab city like Hsinchu Park in Taiwan. It has scope for employment too, because Hsinchu Park, Shenoy says, has 250 ancillary units which require physical labor, and about 200 design houses as well. "These are what seed electronics products," says Shenoy, adding that the whole eco-system, if it comes together, will create 3.6 million jobs by 2015 in India, and "will be one of the biggest drivers of the economy."

Allied Material, a US based equipment manufacturer and a group of Indian equipment manufacturing companies are contemplating a chip manufacturing plant in India. Despite being considered an IT superpower, India still waits for a fabrication facility for semiconductor wafer. India has design, assembling and testing capabilities, and global leaders like Nokia, Motorola and Ericsson are all set to open production plants in India. The only missing link is a chip fabrication unit.

Govt Incentives: Government support for India's technology industry has strengthened dramatically since the 2004 election of Prime Minister Manmohan Singh, an Oxford-trained economist and former central banker who has welcomed foreign investment and helped liberalize the economy. Recently, the government identified the semiconductor industry as a particularly high priority. Finance minister P. Chidambaram declared during his annual budget speech to parliament in February that "the time is ripe to make India a preferred destination for the manufacture of semiconductors." His 2006 budget calls for a three-year program to encourage chip makers to set up factories in India. A detailed national semiconductor policy is still being drafted, but the incentives for qualifying projects are expected to include tax breaks, loans and the option of equity investments through India Infrastructure Finance Co.

India will need to spend heavily to compete with other countries' incentives. China, Ireland, Israel and Malaysia, for instance, reportedly offer much higher tax breaks to semiconductor makers
$540 million grant to persuade Intel to build a $3.5 billion fab there.Union Minister for Communication and Information Technology, Dayanidhi Maran, has taken up the challenge to bring as such a facility to India. The ministry has given six months time to the interested companies to come up with a proposal. The plant would need an investment of about $3-4 billion. The centre government has agreed to make equity participation in the investment.

Sem India: The refusal of the Intel Corporation to establish chip plant in India has led formation of SemIndia consortium with the help of AMD. Vinay agrwal, Chairman of the semIndia has announced the first $3 billion fab in India.
SemIndia recently signed a memorandum of understanding, MOU to locate in a "fab city" technology park outside Hyderabad, in the southern state of Andhra Pradesh.

Quality-of-life considerations and easy access to the new Rajiv Gandhi International Airport, scheduled to open in 2008, contributed to the company's decision.
But SemIndia's Agarwal says financial incentives also were an important factor. He says his company's incentives package includes 1,200 acres, tax breaks and upgraded roads as well as attractive rates for communications, water, power and waste treatment services.

HSMC :Deven Verma, chairman of Hindustan Semiconductor Manufacturing Co. (HSMC), which is planning its own $3.5 billion fab, expects India's incentives to reach nearly the level of Israel's " it could be easily a half billion dollars if you are doing a big fab" he says.
At least some of those incentives are likely to come from India's state governments. Andhra Pradesh, Karnataka, Tamil Nadu and Uttar Pradesh, among others, have been competing fiercely to attract the proposed chip projects, which could create thousands of jobs and other economic benefits.

Different strategies:

All the proposed Indian fab projects thus far plan to operate foundries providing manufacturing services for other companies' chip designs. But a key difference between the projects is their size and scope. Several groups are planning smaller, less costly 8-inch fabs, and others are proposing leading-edge 12-inch fabs. There are merits to both strategies, but some expect the Indian government's forthcoming policy to support only the larger projects.

Verma says he expects "any foundries coming up in the next three years" to qualify for incentives. But **IEMC'**s Singh says government support will be limited to just 12-inch fabs. "They're not going

to put any money into the older fabs," he insists. Government officials aren't tipping their hand yet, but a recent Indian press report quoted an unnamed senior government official as saying that prospective fab developers will have to invest at least $1 billion in India to qualify for government loans and equity investments. If true, that could hurt some of the smaller projects' chances.

Three of the five groups are planning 8-inch fabs, at least for their initial stages. **Nano-Tech Silicon India** broke ground outside Hyderabad in June 2005 on what was to be a $600 million 8-inch fab. But recent visitors to the site say that no construction appears to be under way. And despite sporadic Indian press reports about possible tie-ups between **Nano-Tech and IBM (and more recently Intel),** there have been no recent statements from the project's organizer, Korean businessman Pyung June Min, to clarify whether his company's technology and investment partners are still in place.

Another 8-inch fab was proposed last year by **India's Nest Group**, a diversified electronics conglomerate that announced plans to build a $1 billion memory foundry in India's Kerala state, with backing from Japanese partners. The company has said little about the project since then, however, and did not reply to inquiries from ELECTRONIC BUSINESS. Company officials have said they plan to open a chip design center this year and a chip test and assembly plant in 2007.

HSMC plans to start by relocating an existing 8-inch production line to India. The company's $500 million first phase calls for taking over a 180- to 130-micron manufacturing process, and all the necessary fab equipment, from an as-yet-unnamed U.S. chip maker seeking to outsource some of its production. Verma says his group will continue producing chips for the seller after moving the operation to India. It also plans to use the 8-inch fab for technology development and engineer training while building a second, $3 billion 12-inch fab.

Even **SemIndia,** which aims to ultimately build a $3 billion 12-inch fab, plans to get its feet wet in India first with a chip assembly and test operation. Agarwal calls the assembly and test facility, scheduled to start construction this year, "the first logical step in our vision to make India a semiconductor manufacturing destination." Semico's Itow says that beginning with test and assembly is "not such a bad idea." She says it may help a company establish trusted business relationships before getting into the actual foundry business.

IEMC, however, plans to start immediately with a 12-inch fab and technology for making 90-nanometer circuits. It's likely to cost at least $3 billion, although the precise details—including location, investors and technology partners—are still being negotiated. Singh is adamant that state-of-the-art fabs and process technology will be needed to create a viable Indian chip manufacturing industry. "We cannot compete with older-generation technology," he says, adding that many of the 8-inch foundries in China, Israel, Malaysia and Singapore are struggling to make a profit.

Chris Dieseldorff, an analyst with research **firm Strategic Marketing Associates**, agrees that the economics of 12-inch fabs can be more attractive, although the fabs cost more. "The 12-inch fabs are much more efficient," he says. Besides lower per-chip production costs, they typically offer significant water and electricity savings.

Concluding remarks: India has proved its potential in the chip design activity to the world and going to become world leader in the field. But still chip fabrication is a distant dream. Let India make its own brand called **"Made in India"** and show its competency throughout the world.

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About The Author: The author is Technical Chip Architect working in the field of medical imaging and DNA scanner based chip design and development with Korean chip design company "StarVRay Co., Ltd (www.starvray.com) at Daejeon city of South Korea. The author is also the chairman of BiharBrains (www.biharbrains.org) and chief editor of Manthan.

Environment Education: Let's Saves our Planet for Future Generation

Dr. S. P. Verma, Patna, India

"Creating a society of motivated citizens committed to conservation, preservation and protection of the environment and striving towards a life in perfect harmony with nature"- mission statement of GOI on Environmental Education"

In recent time's environment has become an issue of global deliberations as we are getting reports of contaminated water, polluted air and degraded land/soil all over the world. During the last few decades man has exploited nature to such an extent that the environmental equilibrium has been disturbed. The rise in population has also added new dimensions to the whole issue. Deforestation, urbanization and industrialization as part of the developmental regime have disturbed the environment

In the blind race of development we have affected the natural systems to the extent that our own existence is being threatened. We often forget that we are part of the web of life and environment is our life-line .No doubt there has been growing concern world wide and people are suggesting new ways to conserve our environment.

It becomes the duty of all of us to understand the genesis of the problems and come out with appropriate solutions If anybody does anything wrong to the web of life all of us get affected.

Fast depletion of natural resources, agricultural processes becoming ineffective and mushrooming of slums in the urban areas are grave cause of concern. Nature may not cope with the speed with which man is trying to change the whole world.

An important sector for sensitizing larger populace is through giving priority to environmental education at school level, so that growing children (young minds) can imbibe the spirit of environmental conservation along with a holistic view of our existence.

The students, teachers, social activists, educators and all of us have to take initiative and express/share our experience/views to stop this mad race of development at the cost of our habitat and quality of life

By proper study of environment the students can have a feel of the importance of earth being a natural habitat of all living forms e.g. plants, trees, animal world, micro-organisms and man. Though, as early as in 1991 the Supreme Court called for introducing environmental education in school curriculam but still its status at the institutional level is not satisfactory .The NCERT was given the responsibility to frame a model curriculam and produce standard teaching learning materials.

The NCTE has also advised to include environment education at the B.Ed/M.Ed. curriculam. Some progress has been made but we still have a long way to go. This area must have a built in framework of "Field activity" based learning as well as "learning by doing experiments" so that the future citizens have a clear concept of their immediate environment. There is need for specialized orientation of teachers to make them aware about the latest developments in this field.

It is time that NSTC as a platform of Science Teachers should address to the problems being faced by our teachers in this area as well as should provide an interface with Scientists/Technologists/Social Activists/Educationist working in the area of environment / Environmental Education. Therefore the Focal theme of NSTC-06 has been chosen as

ENVIRONMENTAL EDUCATION - LET'S SAVE OUR PLANET FOR FUTURE

Science Teachers /Educators who have contributed in this area must be involved to share their Expertise/experience among themselves as well as deliberate on the issue

/challenges being faced in India vis-a vis environmental problems.

The following subthemes are being suggested:

(i) Innovations in Teaching/learning practices related to Environmental Education; Field and experiment based learning
(ii) Curriculam development ; Pedagogy of Environmental Education
(iii) Our Natural Resources and Ecosystem-Global and Local perspectives; Overuse and depletion; Environmental degradation
(iv) New age development vis-a vis our natural habitat; Protection/conservation of environment
Effect of globalization on environment in general and quality of life in particular
(v) Value education related to environment. Updating traditional knowledge systems

About the Author: *Dr. S.P.Verma is former HOD,Dept of Physics, Patna Science College,Patna . He is associated with several scientific society of India who wors for the scientific development of the country. He is also president of Science for society, Bihar which works under NCSTC network, Dept of Science & Technology, Govt of India, New Delhi. He can be reached at verma1946@yahoo.com*

Generation & Recycling of Waste Electrical and Electronic Equipment (WEEE): In South Korea

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Worldwide, the production of various electrical and electronic equipments (EEE) is one of the fastest emerging areas. The production of these electrical and electronic equipments resulted in an increase of waste electrical and electronic equipment (WEEE). Every year several million tons of WEEE are being generated in the U.S., EU and Japan. Even in U.S.A. during its last decade, most of the waste electronic equipments have been destined for landfills and incretion or exported to developing countries despite of international accords to limit international shipments. It is expected in USA up to the year 2010 about three billion units of computers, televisions, and other electronics containing hazardous as well as valuable materials will generate. Generation of this huge amount of WEEE will make essential need to examine the product design, systems for component reuse, and process design to improve materials recovery from waste goods. In the European country, when the WEEE directives are successfully implemented, now the protection of environment and the conservation of resources are expected. In China, some projects on WEEE management and recycling are being carried out but there are still some problems that restrict the commercial operation of qualified WEEE recycling enterprises. Some scientists reviewed the research to improve demanufacturing processes through disembly, automation, bulk recycling of ferrous and nonferrous metals, and plastics identification and separation from electronics waste. He also concluded that there are additional challenges in this area to improve product design, acquisition and management of information, and co-ordination with planning and scheduling.

Particularly in Korea due to the rapid economical growth and continuous changes in equipment's features and capabilities causes tremendous increase in sale of new electrical EEE. This development has resulted in an increase of waste electrical and electronic equipment WEEE. This leads the rapid increase in the sales of new facilitated models of EEE in the world. The rapid replacement of old model by latest advanced model causes the mass generation of WEEE. The generation of tremendous amount of bulky WEEE containing variety of hazardous substances is a major social problem and threat to the environment. In 1992, based on the waste control act, the waste deposit-refund system was introduced in Korea. In this system, a deposit is imposed at a constant rate on products and packages that are readily recyclable, and is returned after the recycling of material. In the year 2003 the Extended Producer Responsibility (EPR) system was enforced in Korea to promote recycling practices.

These days the electrical home appliances (EHA) are the basic need of each modern family. However there are lots of different types of EHA are available in market and similarly the peoples are using this selectively depends on their choice and needs. But as TVs, refrigerators, washing machines and air conditioners are the most common EHA and, simultaneously a huge amount of the waste of these appliances is generated after the completion of their end-of-life. This is due to the rapid economical enhancement followed by improvement of living standards of the people. The population growth, new household appliances and decrease in product life span occurs due to the preference for new advance models. But in the period 2000-2004 the sales of EHA decreased up to 25%. The reason of this decrease in sale is attributed to the saturation of households with EHA. Another major reason observed during this period is the mass demand of small sophisticated refrigerator to keep Traditional Korean pickle "Kimchi", caused the rapid decline in the sell of normal big refrigerator in Korea.

Due to the competitive market and the rapid changes in equipments features resulted in increase in the sale of EHA and simultaneously due to the replacement of old model by new one the quantity of WEHA is increased. In case of TVs the 0.237 million units of WEHA were generated in the year 1996. The launching of new models of TVs with plasma display panel (PDP) and liquid crystal display (LCD) with large screen has also attracted the customer to purchase the new model of digital TV by replacing the old model. The increase in the generation of waste for all four items viz. refrigerator, washing machine, air-

conditions and television has been analyzed. The major WEHA is TVs and refrigerator. If we analyze this rate wise the generation of waste of TVs and air-condition is maximum. As reported in Korea many different agencies are active for the collection and proper recycling of the WEHA. The total unit collection per year is increased during the year 1999 to 2003 from 1.116 million units to 2.031 units. Due to the public awareness and Government policy, the collection quantity was increased from 1.2 million to 2 million units. As Korea is resource deficient country, the target is 100% recycling. The recycling will conserve the resources and protect the environment. This rapid increase in rate of recycling of WEHA is expected due to the implementation of EPR system in the year 2003.

PCs and mobile phones have much importance in each area due to the need of quick exchange of global information. The increase in percentage of obsolete from 22% to 42% during the year 1999-2003. In coming years, there is a chance to increase the quantity of the obsolete as the PCs have short average life i.e. 5 years only. These waste generally kept in home as obsolete due to its small size and the chances of its upgradation. Simultaneously, the amount of the waste generation is also increased from 273 to 597 thousands units. However, the sale of PCs was found maximum 3,409 thousands unit in the year 2000. The sale of PC was decreased comparatively after the year 2000; this may be due the saturation. According to the Korean Association of Electronics Environment KAE, the number of the waste PC recycled by producers in 2002 is only 6.4% of the estimated waste PCs. After the implementation of EPR system in subsequent year, the quantity of recycling increased about 50% of the estimated waste PCs. In the year 2002 total population of subscribers of the mobile phone was 33,591 thousand units i.e. 3/4 th of the total population of Korea. Korea is one of the leading producers of mobile phone in the world. However the quantity of the obsolete increased from 6,645 to 12,494 thousand units during this period but sales remained almost constant with slight enhancement. The EPR system holds producers accountability for the entire life cycle of their product in order to incite innovation in product design, material use, and business management through economic incentives. Since January 2003, the EPR system has applied on 15 items including TVs, refrigerator, air conditioners, washing machine etc. Furthermore, audio products and cellular phones are considered under EPR system in 2006.

Existing technologies for recycling

The manufacturers had no mandatory responsibility for the recycling of WEEE before the enforcement of EPR system. After the implementation of EPR system, the mandantory recycling for each product is fixed by Govt. of Korea on the producers and importers under EPR system. The mandatory cost for recycling is included with the production cost by Govt. of Korea. After EPR enforcement extra money related to the environmental pollution & resources on product, increased the price of the product. The increase in price of the EEE relatively decreased the number of customer and resulted in the optimum level to balance in demand and supply gap.

The recycling of WEHA became more effective due to the effect of EPR system. The domestic electronic companies are recycling the major EEE viz. refrigerators, washing machines and air conditioners equipments in their recycling centers. The cathode ray tubes (CRT) of TVs and monitors are recycled on commission basis by private CRT recyclers for the glass. Generally, the recycling processes consist of dismantling-shredding/grinding followed by mechanical separation for beneficiation. There is no feasible economical process available for the recycling of printed circuit boards (PCBs). CRT recycling is gaining more importance, due to its weight as major waste in TVs and PCs. The lead component present is generally serrated by various technologies and recycled for the manufacturing of new CRTs. The several researchers have carried out the studies by using strong acids but switch off due to strict environmental regulations. The attempt has been also made to recover yttrium fluorescent material from panel sludge.

The recycling of waste PCBs of PCs and mobile phones is gaining importance due to the presence of valuable metals in it. After the dismantling of major components of the PCs, the classified materials are used for the recycling. The recycling of waste mobile phones is much attractive due to its small size and, the PCBs containing relatively high contents of precious metals such as gold, silver, palladium and rhodium, etc. The shredding of waste PCBs and shipment to a copper smelter is one route for recycling and, the other route is shredding-incineration-melting into copper alloy containing

precious metals and their refining processes utilizing hydrometallurgical techniques. In addition to these processes, Korea has made sincere effort to develop eco-friendly process using mechanical pretreatment in combination with hydrometallurgical technique. Researchers have reported that the metal liberation could be achieved up to 95-100% from PCBs utilizing a swing hammer type impact mill or stamp mill, but those pretreatment processes are not applied in the commercial plant yet. Korea is facing difficulties to develop the technology for metal liberation from PCBs due to the complex material of construction of PCBs and lack of appropriate grinding technology. A series of hydrometallurgical processes, including leaching, separation and recovery has been employed for the recovery of valuable metals from the metallic concentrate. Some Korean technologies are under investigation for leaching of the valuable metals from waste PCBs viz. electro-generated chlorine leaching, ammoniacal leaching and bacterial leaching. The development of individual process or combined processes, including precipitation, cementation, solvent extraction, ion exchange and supported liquid membrane is underway. Eco- friendly and energy-saving processes are necessary to comply with stringent environmental regulations.

Remarks: The Korean government is making consistent efforts to improve the recycling rate to the standards indicated in the EU directives for WEEE. The EPR system is playing very important role in this direction. The need of time is to increase more awareness among the people. In Korea, the recycling of WEEE has been taken into consideration not only by government but also by public, manufacturer and recycling associations. The recycling of WEHA is successfully carrying out by recyclers except CRTs for glass recycling. The recycling of PCBs and mobile phones needs more development as these are made-up of variety of complex hazardous heavy metals, materials and components. Due to the lack of feasible technologies, the PCBs are still incinerated and landfilled.

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An Introduction to Mass Spectrometry

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Introduction

Mass spectrometry is an analytical technique for measuring the mass of chemical (and atomic) species. Mass spectrometry has been described as the smallest scale in the world, not because of the mass spectrometer's size but because of the size of what it weighs. A mass spectrometer determines the mass of a molecule by measuring the mass-to-charge ratio (*m/z*) of its ion. Ions are generated by inducing either the loss or gain of a charge from a neutral species. Once formed, ions are electrostatically directed into a mass analyzer where they are separated according to *m/z* and finally detected. The result of molecular ionization, ion separation, and ion detection is a spectrum that can provide molecular mass and even structural information. Mass spectrometers constitute a large, very diverse, and widely employed and produced class or family of instruments. It is likely that no other type of complex instrument has been as important for so many fields of science in the twentieth century.

History of Mass Spectrometry

Today's mass spectrometer is based on the seminal work performed by Sir J. J. Thomson of the Cavendish Laboratory of the University of Cambridge. Thomson's research, which led to the discovery of the electron in 1897, also led to the first mass spectrometer while he was measuring the effects of electric and magnetic fields on ions generated by residual gases in cathode ray tubes. Thomson noticed that the ions move through parabolic trajectories proportional to their "mass-to-charge" ratios. Thomson received the 1906 Nobel Prize in Physics "in recognition of the great merits of his theoretical and experimental investigations on the conduction of electricity by gasses."

The time period from the late 1930's to the early 1970's was a time of great achievement in the field of mass spectrometry. By the end of World War I, the work of Francis W. Aston and Arthur J. Dempster brought improved higher accuracy mass spectrometers into reality. Later, Alfred Neir incorporated these developments along with advances in vacuum technology and electronics to greatly decrease the size of mass spectrometers. In 1946, William E. Stephens proposed the concept of time-of-flight analyzers, which also separated ions by measuring velocities as the ions move in a straight path toward a collector. The other analyzer in use today, the quadrupole analyzer, was developed in the mid-1950s by Wolfgang Paul. This analyzer is capable of separating ions with an oscillating electrical field further increasing the utility of mass spectrometers. Another Paul innovation was the quadrupole ion trap, which is a device specifically designed to trap and measure ions. The first ion trap became available commercially in 1983 and now both the quadrupole and quadrupole ion trap are the most widely used mass analyzers in the world and for his innovative work Paul was awarded the 1989 Nobel Prize in Physics. This era of rapid development fueled the enthusiasm that ushered in even greater discoveries during the 1980s and 1990s.

Two techniques developed in the mid 1980's, electrospray ionization (ESI) and matrix assisted laser desorption/ionization (MALDI), have had a significant impact on the capabilities of mass spectrometry. ESI is the production of highly charged droplets that are treated with dry gas or heat to facilitate evaporation, which eventually eject the ions in the gas phase. ESI was first conceived by Malcolm Dole in the 1960's yet, by incorporating technology that had become available over the years, John Fenn put ESI into use for biomolecule analysis in the 1980's. MALDI was developed by Tanaka et al. (Japan) as well as by Franz Hillenkamp and Michael Karas, both of Germany. In 2002, the Nobel Prize in Chemistry was received by John Fenn for the development of electrospray ionization (ESI) and Koichi Tanaka for the development of soft laser desorption (SLD) in 1987. MALDI uses a laser to desorb sample molecules from a solid or liquid matrix containing a highly UV-absorbing substance.

Basic Components of a Mass Spectrometer

Mass spectrometers can be divided into three fundamental parts, namely the **ionisation source**, the **analyser**, and the **detector.**

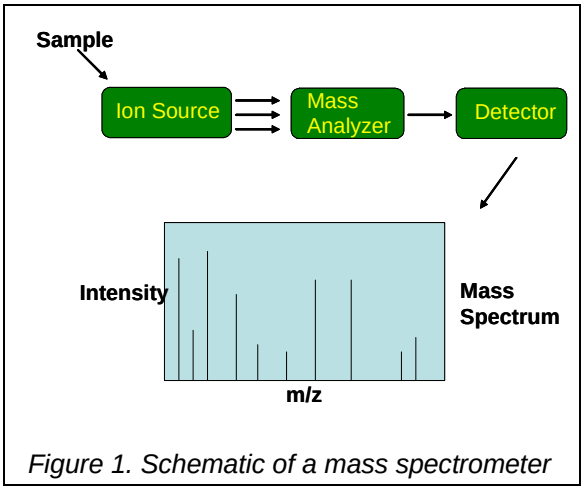

Figure 1. Schematic of a mass spectrometer

The sample under investigation has to be introduced into the ionisation source of the instrument. Once inside the ionisation source the sample molecules are ionised, because ions are easier to manipulate than neutral molecules. These ions are extracted into the analyser region of the mass spectrometer where they are separated according to their mass (m) -to-charge (z) ratios (m/z). The separated ions are detected and this signal sent to a data system where the m/z ratios are stored together with their relative abundance for presentation in the format of a m/z spectrum.

The analyser and detector of the mass spectrometer, and often the ionisation source too, are maintained under high vacuum to give the ions a reasonable chance of travelling from one end of the instrument to the other without any hindrance from air molecules. The entire operation of the mass spectrometer, and often the sample introduction process also, is under complete data system control on modern mass spectrometers.

Methods of Ionization

Ionization is a process of producing an electrically charged protein molecule from a neutral protein molecular by either adding protons or removing electrons. The different ionization methods, listed below, work by either ionizing a neutral molecule through electron ejection, electron capture, protonation, cationization, or deprotonation, or by transferring a charged molecule from a condensed phase to the gas phase. Many ionisation methods are available and each has its own advantages and disadvantages. The ionisation method to be used should depend on the type of sample under investigation and the mass spectrometer available.

Atmospheric Pressure Chemical Ionisation (APCI)
Chemical Ionisation (CI)
Electron Impact (EI)
Electrospray Ionisation (ESI)
Fast Atom Bombardment (FAB)
Field Desorption / Field Ionisation (FD/FI)
Matrix Assisted Laser Desorption Ionisation (MALDI)
Thermospray Ionisation (TSP)

Electrospray Ionisation (ESI) and Matrix Assisted Laser Desorption Ionisation (MALDI)

The ionisation methods used for the majority of biochemical analyses are **ESI** and **MALDI.** ESI is a newer method of ionization that does not cause excessive fragmentation. ESI generates ions directly from solution without requiring any heating. Therefore, this method can be used for heat-sensitive molecules which cannot be ionized by heating. Sample is sprayed in a fine spray in the presence of an electric field. Charge accumulates on the sample droplets which then explode due to mutual repulsion of charges leading to the formation of ions. Both singly and multiply charged ions can be produced in this manner.

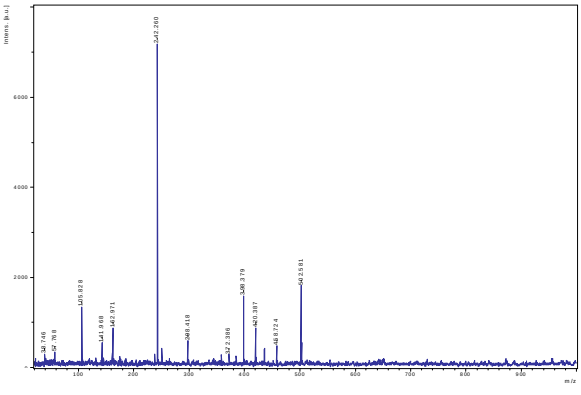

Figure 2. A typical mass spectrum of protein obtained by MALDI MS.

MALDI is another method of ionization that does not require any heating for the production of ions and can be used for heat sensitive molecules.

In this method, the sample to be analyzed is mixed with a matrix compund and crystallized. This matrix compound is usually a weak inorganic acid. This mixture is then excited with a laser which results in the evaporation of the matrix compund. The matrix compound also carries the sample molecules into the vapour phase, resulting in indirect vaporization of the sample. Sample ions are formed by the exchange of electrons and protons with the matrix compound. MALDI is especially useful for protein and peptide identification using masses alone since the masses of ions can be determined with great accuracy.

Figure 3. A MALDI Mass Spectrometer

Application of Mass Spectrometry

Mass spectrometers are used in industry and academia for both routine and research purposes. The following list is just a brief summary of the major mass spectrometric applications:

•**Biotechnology:** *the analysis of proteins, peptides, oligonucleotides*
•**Pharmaceutical:** *drug discovery, combinatorial chemistry, pharmacokinetics, drug metabolism*
•**Clinical:** *neonatal screening, haemoglobin analysis, drug testing*
•**Environmental:** *PAHs, PCBs, water quality, food contamination*
•**Geological:** *oil composition*

Mass spectrometers have become pivotal for a wide range of applications in the analysis of inorganic, organic, and bio-organic chemicals. It is being continually improved and has recently had significant advances in its application to molecular biology, where it is now possible to perform sequencing of peptides and proteins; studies of noncovalent complexes and immunological molecules; DNA sequencing; and the analysis of intact viruses.

ESI and MALDI mass spectrometry have allowed for sophisticated applications of mass spectrometry to the fields of biology and medicine. ESI allows for very sensitive analysis of small, large and labile molecules such as peptides, proteins, organometallics, oligosaccharides, and polymers. ESI has made liquid chromatography mass spectrometry routine, adding a new dimension to the capabilities of liquid chromatography characterization. MALDI has had its wide impact on the field of protein research. The ability to generate MALDI-MS data on whole proteins and proteolytic fragments is extremely useful for protein identification and characterization. The trend toward mass spectrometry as the technique of choice for identifying and probing the covalent structure of proteins is accelerated by the genome project. Genomics demonstrated the power of high-throughput, comprehensive analyses of biological systems. Genomics also provides complete genomic sequences, which are a critical resource for identifying proteins quickly and robustly by the correlation of mass spectrometric measurements of peptides with sequence databases. As the human genome is completed, it can be argued that the characterization of genomic proteins (a field of research also known as "proteomics") is the most important application of modern mass spectrometry.

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Blooming and Bubbling India - I

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Abstract:

Mithilesh Jha, an IITian graduate engineer from Kanpur in computer engineering and working in some high executive position in Cadence India met me during my morning walk today. He was with one of his sons who is in IT-BHU studying computer engineering. I was amazed to hear from him that he has left his job and gone for starting his own chip designing company. Many young Indians are doing this. Even few fresh IIM graduates are preferring to go for doing something of their own leaving the foreign postings with huge salaries that couldn't be dreamt off even few years ago. As it appears from all the news and reports, Indian economy is booming.

This article presents real picture of India on international level in various fields and will be continued further.

India a trillion-$ economy: Indian GDP at current market prices, according to advance estimates, is Rs 41, 00,636 crore in 2006-07. With the rupee below 41 a dollar, India becomes a trillion dollar economy. And it is going to race up.

NRI: According to the report of the high-powered committee on making Mumbai an international financial hub, the 20-million strong NRI community has an estimated financial wealth of over $500 billion. Factor in other assets like real estate, gold and art and the total estimated wealth of the NRI community, the report says, is over $1 trillion.

FDI: India at least its government aims at $30 billion in foreign direct investment this year on the back of huge interest in the country from auto and electronics manufacturers. FDI would constitute 3.3% of GDP, up from 2.5% last fiscal. In 2006-07, FDI inflows touched $19 billion, of which $3.5 billion were reinvested earnings. Interestingly, FDI inflows in the current year are mainly increasing in manufacturing, auto, semiconductor, electronic hardware and services.

India in 2025: According to a recent study from McKinsey Global Institute, India's market will be the world's fifth largest by 2025 from the current ranking at 12 surpassing Germany. And the middle class will have grown almost 12 times, from 50 million today to 583 million. Over 23 million Indians-more than the population of Australia today-will number among the country's wealthiest citizens. Simultaneously, the deprived segment will drop from 54 per cent of the population in 2005 to 22 per cent by 2025.

Superlative Performing Indian IT players: The top five suppliers of offshore product design services (PDS) are large Indian IT companies and account for more than 60 per cent of the market, according to a newly-released ARC advisory group services report. The offshore PDS market is set to grow by 28 per cent annually, and is estimated to be over $4.1 billion business in 2011.

India becoming outsourcing hub for market research (MR): While most of the global firms like Taylor Nelson Sofres (TNS), MarketTools and Greenfieldonline are operating large captives in India, many Indian companies are gearing up to tap opportunities in market research outsourcing. India today has about 15 MR firms including large ones like Ugam Solutions, Annik Systems, Cross-Tab and Markelytics. Even BPO firms like WNS and knowledge process outsourcing firm like eValueserve are significantly involved in MR.

According to a study released by Evalueserve, India's top Knowledge Process Outsourcing firm, Indian KPOs will generate nearly 280,000 jobs and up to $11-12 billion as revenues by 2010. India Business Outsourcing sector is moving towards high in many areas, be it legal services, financial analysis and report, publishing, engineering services, product or architectural designs, or R&D.

India IT companies to hire 1 lakh : India's top five software companies plan to add 1,00,000 this fiscal year on top of a record 76,500 new employees who joined these companies last year.

Manufacturing that has an employee base of 41.5 million will double by 2010.

Net profit for the top five outsourcing companies - Tata Consultancy, Infosys, Wipro Ltd., Satyam Computer Services Ltd and HCL Technologies Ltd, ranked in that order - grew to a collective US$3 billion (euro2.2 billion) for the fiscal year through March, up 47 per cent. Sales, meanwhile, jumped 41 per cent to a combined US$13.6 billion(euro10 billion). And the top four software companies (HCL Technologies figure was not available) won 713 new clients last year.

Indian IT consulting firm Tech Mahindra has been ranked as one of the top five leaders in the overall business support systems (BSS) worldwide. Tech Mahindra focuses on the communications space, leaving behind the global majors like Capgemini, CSG Systems and Comverse, as per the latest Gartner report — 'Market Share: Business Support Systems for the year 2006'.

Pharmaceutical: A dozen Indian pharmaceutical companies led by Aurobindo Pharma, Wockhardt, Ranbaxy, Dr Reddy's Lab and Sun Pharma have bagged almost one-fourth of generic drug approvals in the US in the four-and-a-half month from December 2006. Out of the 186 original abbreviated new drug application (ANDA) approvals granted by the US Food and Drug Administration (FDA) during the period, about a dozen Indian companies bagged 43 approvals, which is 23.11 per cent of the total approvals granted.

According to the comparative survey by the Japan External Trade Organization (JETRO), between 2006 and 2007 India is top of the list with an index of 67.6, followed by Vietnam and China with 51.5 and 39.9, with regard to the business prospects of the subsidiaries of Japanese companies.

Rural spending shows prosperity: According to the 61st round of the National Sample Survey Organisation (NSSO) report, the number of rural households using LPG has increased six-fold between 1993-94 and 2004-05. However, only 12 in 100 households use cooking gas. Rural India is spending a lot more money on education: Between 1999-2000 and 2004-05, the share of rural expenditure on tuition and other educational fees has risen from 29% to 44%.

Private Sector: RIL FY'07 turnover crosses $25 billion mark RIL, India's most valued firm with a market cap of over $50 billion, has become the first private entity to cross the 25 billion dollar revenue mark.

Corporates have lined up investment worth $400 billion, and are treating human resources as precious commodity. While Tata Motors are having effective alliance with Italian giant Fiat, Mahindra and Mahindra is working with Nissan and Renaults in a facility with an investment of Rs 4,000 crore.

Indian consumers will soon have one of the cheapest mobile phones in the world, priced at Rs 777 ($19), while Tata Motors are trying to produce entry level passenger car at Rs 1 lakh. According to estimates while the number of Indian subscribers for cell phones will go above 250 million, the sales of passenger vehicles will be exceed that in Germany by 2010.

The personal computer market is set to grow by 22 per cent in this financial year and may record sales of 6.5 million units. The Indian information technology and related services (IT/ITeS) industry is predicted to become a $100 billion plus industry by 2011, growing at a compound annual growth rate (CAGR) of 18 per cent, according to an IDC report.

Thee organized retail sector will triple in size from Rs 35,000 crore in 2004-05 to Rs 1,09,000 crore by 2010. Reliance, Aditya Birla Group, and Bharati with Wal-mart will be major players, reliance retails alone aims to recruit over five lakh employees by 2010.

All village panchayats in Kerala would soon have their own custom-made web portals with all the information relating to the panchayat in Malayalam. Akshaya, a Kerala government initiative for cent percent e-literacy in the state, is all set to implement a pilot project to establish panchayat-level web portals with people's participation in select panchayats of Kannur district with financial and technical assistance from Unesco.

Indian expressways are getting six-lanes. Aviation industry is booming. Indians are becoming major spenders abroad besides acquiring big companies. Railways are investing in upgradtion of technology.

India vs. China: The eight Indian companies are part of S&P's list of 300 mid-size companies across 37 countries in the latest S&P Global Challengers List. India ranks seventh in terms of the companies per country that figure in the list. In contrast, China has four companies on the list.

An innovative nation: In a new study, India has emerged as the second best place for business innovation after the US. In a survey of 485 senior executives worldwide carried out by Hong Kong-based Economist Intelligence Unit, Japan has emerged as the world's most innovative nation in terms of business practices, followed by Switzerland, US and Sweden. India has been ranked at 58th position, ahead of China's 59th position in a ranking of 82 economies, based on their level of innovation during 2002-06. But the report also concludes that India will give away its lead over China as an innovative country in the next five years.

IT excels: IT services major Wipro Technologies said it has bagged the 'SAP Pinnacle Award' in the area of Software Solutions Leadership.

Industrial Manufacturing Corridor According to India and Japan, the DMIC (Delhi Mumbai Industrial Corridor) project-to be launched in 2008 and completed by 2015-would entail an investment of $45-50 billion.

Corporate India helps rural poverty alleviation: HLL will aim to reach 600 million consumers in five-lakh villages through one-lakh entrepreneurs by 2010.

India matters for Airbus and Boeing: Rapidly expanding Indian carriers have ordered close to $40 billion worth of big jets over the past two years. So far, Airbus, has bagged 295 orders from Indian customers since January 2005, vs. 138 for Boeing. The value of Boeing's order book is close to $20 billion at list prices, while it is roughly $22 billion for Airbus.

Chindia ahead of other BRIC members: According to a survey of 350 international, mainly expatriate investors, mostly belonging to the US, UK and continental Europe by Luxembourg-based broker Internaxx, Chindia make a more compelling proposition than the first half of the BRICs acronym. The survey found that 42 per cent of international investors felt positive about China and 32 per cent about India, while only five and six per cent respectively felt positive about Brazil and Russia.

White Revolution continues: Indian dairy industry will reach Rs5.20 lakh crore by 2011. "Out of the anticipated output of 120 million tonnes, the share of liquid milk will be 97.5 million tonnes, while the remaining 22.5 million tonnes will get converted into milk products."

Manufacturing Sector Moving in top gear: India's manufacturing sector registered the highest growth in over a decade at 14.1 per cent in March 2007, up from 10.1 per cent in the same month of the previous year, the commerce and industry ministry said Tuesday. The growth rate of the sector has doubled since 2002-03 from six per cent to 12.3 per cent in 2006-07.

Sky-High Ambitions of Indian Outsourcers: Tata Consultancy Services (TCS) has worked on projects for GE Aviation involving digitally testing the configuration of jet designs and is currently designing the business class portion of a plane for an undisclosed aviation customer. Tata Technologies hopes to leverage the expertise of its parent company to reduce the cost and weight of airline components for international customers. Infosys has designed part of the Airbus A380 super jumbo jet, which is now undergoing test flights. Last year it set up an engineering center to team with Spirit Aerosystems (SPR), a major supplier of structures including fuselage, nose sections, and floor beams.

India's Global raid continues: Billionaire Vijay Mallya's distillery group agreed to buy Scottish liquor maker Whyte & Mackay for 595 million pounds ($1.18 billion, Rs4, 700 crore), extending a record year for international takeovers by Indian companies. Mallya formed United Spirits by combining McDowell & Co, Shaw Wallace & Co, Herbertsons and other liquor makers of the group. The company, with 145 brands and 69 factories, became the world's third largest spirits company after Diageo and Pernod Ricard. Today's acquisition of Whyte & Mackay promises to enhance Mallaya's position in the Forbes' list of billionaires, which placed him 746th in 2006.

Mumbai's famed diamond district of opera house becoming a global diamond-trading hub: Indians are becoming integrated global players, involved in the entire supply chain right from sourcing of the gems to retailing finished

jewellery. The recent spate of acquisitions by the big players in the business of reputed US brands, and the removal of import duty on polished diamonds are giving big push in the direction of creating a global hub in India. India is already the largest manufacturer of cut and polished diamonds with 10 out of every 11 diamonds being processed here. Diamond and jewellery exports reached $16.6 billion last year, second only to IT-related exports. With London and Antwerp slowly declining in importance, India could soon become the manufacturing as well as trading hub.

India exports cars: The export of passenger cars from India is expected to touch one million by 2010, a shade lower than the last financial year's total domestic sales of 1.3 million, and nearly a third of the projected production of three million. Last year, the country exported only 198,478 cars - less than 13 per cent of the 1,544,850 produced.

India Attractting global manufacturers: Singapore-based $2.1b IT component major eSys Technologies, with worldwide back office operations is investing Rs 1,000 cr in India. This includes a Rs 250 crore investment in setting up a PC manufacturing plant at Nalagarh, Himachal Pradesh with an annual capacity of 1.2 million units and another Rs 100 crore in global back-office operations in Chandigarh.

India as R&D hub

1.The world's largest manufacturer of healthcare products, Johnson & Johnson, is making India a global hub of its research and development as it looks to ramp up its pharmaceutical business in the country. The company is investing $17.5 million in its analytical and pharmaceutical development centre in Mumbai, which conducts early-stage drug development. In a few months, the number of professionals working there will rise from 65 to 150.

2.Korean consumer electronics major Samsung would hire about 700 R&D software engineers for its centre at Noida. "Currently, we employ 300 people at Samsung India Software Centre (SISC) and would take the number up to 400 by this year end, eventually we hope to touch 1,000 in the next three years," Samsung India Electronics Vice President Software Centre Vikram Vij told PTI.

3.Blackberry-maker Research In Motion (RIM) will soon set up its R&D and customer support base in India. The company could in fact look at turning India into a hub for its customer support services eventually.

4.Indian expatriates returning to work on R&D: According to the Society of Indian Automobile Manufacturers (SIAM), there are already over 250 Indian expatriates who have returned to work on R&D in domestic automobile companies Mahindra & Mahindra, Ashok Leyland, Tata Motors and Hindustan Motors. SIAM predicts that their numbers will double in two years. With investments of over Rs 100,000 crore lined up in the Indian automobile industry, and European and US car majors making an aggressive push into India, Indian car companies have begun to understand the significance of R&D.

Textile sector invests tons: India's textile sector is expected to attract investment of Rs 150,600 crore in the next five years and will achieve the export target of Rs 225,665 crore (55 billion dollars) by 2012. The industry that is growing by 9-10 per cent would increase to 16 per cent in the coming years.

India getting benchmarked: Nissan Motor Co, Japan's third-largest automaker, is designing a $2,500 car to compete in India with the low-cost model planned by Tata Motors, Chief Executive Officer Carlos Ghosn said. "We are working on how we can make a car for $2,500," Ghosn told reporters today at a dinner in Versailles, France. A Nissan advance engineering group is doing the study," he said.

Is not India bubbling?

Acquiring World over: Sun Pharmaceutical Industries acquires Israel-based Taro Pharmaceutical Industries Ltd, a multinational generic manufacturer, in an all cash deal for $454 million (Rs1, 844 crore).

Rural Connectivity improving fast: Prime Minister Manmohan Singh pledged Rs 480 billion to dramatically step up its spending on roads in rural areas for a four-year project ending in 2009 to connect 66,000 villages.

India's talent crunch a myth: Only 9 per cent of Indian employers found it difficult to fill positions because of lack of suitable talent as against 41 per cent of employers worldwide. Additonally, as

opposed to the global trend, the crunch seems to be easing off in India. The global recruitment firm Manpower conducted the study in late January 2007.

Finishing schools for improved employability: Dale Carnegie, one of the prestigious universities in the US, and other agencies are exploring the idea of setting up an IT finishing school in Karnataka and elsewhere for providing specialised training to fresh engineering pass-outs to make their ready for IT industries.

Auto makers partner state-run ITIs: Auto and autoparts makers, such as Toyota and the Sona Koyo group of autopart makers, are partnering state-run ITIs to train students to meet their specific requirements and save on the time spent training workers. The number of workers required in the industry is estimated to go up 10-fold to 25 million. Of this, a tenth, or about 2.5 million workers, are likely to be directly employed in the industry in shopfloor positions such as machinists and technicians.

India Flying High: The mega carrier being created by merging Air India and Indian Airlines - National Aviation Co. Ltd (NACL) - will begin its first direct non-stop Indo-US flight on August 1. While AI and IA have placed orders for 111 new generation planes, their aging fleet would get 25 new Boeing and Airbus by this year-end. In 2006, the aviation industry witnessed a growth of nearly 50% with 16 million passengers buying around 30 million seats. Projected figutes indicate that over 70 million passengers are expected to fly by 2010.

Indian mangoes go to USA and Japan too: After the US, India has started exporting mangoes to Japan with the first consignment of one tonne of Banganpalli mangoes from Tirupati sent to Tokyo. It will be through mango-growers cooperatives and involve women's Self Help Group to ensure that farmers get better price for their produce.

India as destination: IT solutions and software provider 3i Infotech launched a new Global Development Centre (GDC) in Chennai. The centre will focus on enhancement and development of the company's flagship insurance solution 'Premia' and banking solution 'Kastle'.

Manufacturing too flourishing: Wärtsilä Corporation has received an order for six turnkey biomass-fuelled power plants from German-based company Bayernfonds BestEnergy 1 GmbH & Co. KG in April for a total value of approximately euro 100 million.

NXP (Next eXPerience) Semiconductors, the new semiconductor company founded by Philips, is partnering with mobile communication service provider Reliance Communications (RCom) to bring out low cost handsets in India. The price of the handset could be around Rs 800 ($20) with features such as colour display, MP3 player and FM radio.

Arham in Sriperumbudur: Arham Plastics has commissioned a new plant in Sriperumbudur, primarily to meet demand accruing from increased requirements of Korean auto major Hyundai. Arham will be thereby doubling its auto components production capacity,

India Fusion research becomes neighbour's envy: "The Indian programme is very ambitious. I believe $130 million has been spent by the Indian government for this kind of research while we have spent just $30 million so far," said Song Tao Wu, the deputy director general at the China's Institute of Plasma Physics.

IT goes superfast: India's IT exports are growing at more than 30% annually and are expected to cross $50 billion in early 2008. Indian enterprises are expected to invest Rs 8,974 crore on information technology (IT) in FY08 - an increase of 26% when compared with the FY07 expenditure of Rs 7,123 crore. However, IT still has miles to go before it catches up with global giants in terms of productivity. An American IT professional contributes nearly ten times higher to the company's turnover than his Indian counterpart.

Entry-level salaries increase: Major IT firms and even some mid-size ones have increased their entry-level compensation packages by 10-16 per cent, as competition intensifies to attract the best talent from campuses. TCS is offering annual salaries ranging between Rs 2.7 lakh and Rs 3.3 lakh, depending on the colleges and course streams. Wipro is contemplating a 10-15 per cent hike in freshers' salaries. For graduates joining in 2007, it had offered Rs 2.4-2.7 lakh per annum. The Infosys compensation package for graduates joining in 2007 stood at Rs 2.75 lakh per annum.

India ahead of China's offshore market: China's push to become an alternate off shoring hub for MNCs tackling soaring wages and high attrition rate in India remains a distant dream as its market is developing slower than expected. Despite massive government support and huge visibility on the global arena, China's offshore market has not taken off as expected and still has a long way to become a potential alternative to India, according to technology research firm Forrester.

Europe convinced: Some, if not all West European Governments are gradually realising that offshoring and offshore outsourcing is not a choice for Europe - it is a fact. Corporate Europe is already gearing up. Europe's top 500 companies could potentially save Euro 50 billion annually, or almost Euro 100 million on average per company, by offshoring many of their back-office activities.

Biopharma growing: In India, biopharma, the largest segment of biotech, grew by 32% to $1 billion in 2005-06. The domestic biotech sector is growing at a CAGR of 35%, and is expected to touch $5 billion by 2009-10, according to estimates. The focus area of leading companies such as Biocon, Dr Reddy's, Panacea, Shantha Biotech, Workhardt and Zydus, is vaccines and bio-generics.

Sweetening India: Sugar production of India, the world's second largest producer after Brazil, is all set to touch 27 million tonnes in 2006-07 season with output already crossing 26 million tonnes till 15 May. The sugar production in 2005-06 season stood at 19.3 million tonnes. Sugar year runs from October to September

And the cement industry: The demand for cement in the country is projected to go up to 200 million tonne a year by 2010 from 149 million tonne at present, by which time the capacity will have risen to 240 million tonne a year from the current 165.

Indians excel: Indian-born Srinivasa SR Varadhan on Tuesday accepted the Norwegian Abel Prize, known as the 'Nobel Prize for mathematics'. King Harald presented the award worth 6 million kroner ($920,000) at a ceremony in Oslo.

Harjit Gill of Dakoha village in Punjab made history by taking over as the 527th mayor of the city of Gloucester in England. He is the first Asian to be mayor of the historic city - famous for its docks, the 1300-year-old Gloucester Cathedral of Saint Peter's and, lately the locale of the first Harry Potter film.

Indian artists going rich: Indian artists never had it so good - an auction of modern and contemporary Indian art here including those by masters like M F Husain, Francis Newton Souza and Tyeb Mehta - has fetched a fabulous $ 8.809 million. The auction was held by the Christie's last evening and the highest price of £ 720,000 went for Syed Haider Raza's La Terre (1985).

India in space: "The Chandrayaan-1 mission is making substantial progress." The CARTOSAT-2 satellite launched in January this year has special cameras that have a resolution of less than one metre, and is being used for detailed map development applications and disaster management activities. The successful launch of INSAT-4B that has 24 DTH transponders has been a major milestone. The EDUSAT, a satellite dedicated to education, has connected around 10,000 classrooms, benefiting rural and remote areas. Other achievements are the pathbreaking demonstration of the capability to recover an orbiting satellite through the Space Recovery Experiment, the successful ground testing of the indigenously developed cryogenic stage for the Geo-Stationary Satellite Launch Vehicle, and the demonstration of the Supersonic Combustion Ramjet required for advanced rocket systems. http://timesofindia.indiatimes.com/Chandrayaan-1

Retail on move: Aditya Birla group announced an investment of Rs8,000-9,000 crore over the next five years to start a retail chain. Bharti, Reliance, and Aditya Birla Retail Ltd (ABRL, the name of the group's company in the retail business) enter the $300 billion (Rs12.3 lakh crore) Indian retail market. According to Wal-Mart Stores Inc., which will partner Bharti in a wholesale venture, store chains currently account for 4% of retail sales, but this number is set to increase to 35% by 2015.

Billion Club Expanding: From January this year until now, at least 20 companies now have a market capitalisation of $1 billion taking total number of publicly traded Indian companies with a market cap of $1 billion each to 146 from just 98 companies a year ago. The Indian stock markets

are now flirting intimately a combined market capitalisation of $1 trillion.

Exemplary Telecom sector: With an addition of 5.15 million wireless subscribers in April, the total telephone users are now 212.02 million, the world's fourth biggest and tele-density is 18.74%. Total broadband connections in the country has reached 2.43 million by the end of April with an addition of 0.13 million connections during the month, compared to 0.09 million added during March, a growth of 5.65%. India has many 'firsts' to showcase in global telephoney. Just this calendar year, India has had the distinction of having the world's lowest call rates (40 paise), the fastest growth in the number of subscribers (15.31 million in 4 months), the fastest sale of a million mobile phones (1 week), the world's cheapest mobile handset (Rs 777) and the world's most affordable colour phone (Rs 1,234).Roaming tariffs are slashed by 50% and call rates are as low as 40 paise, as against Rs 12 in the UK, Rs 2.5 in Sri Lanka and Rs 7 West Asia. Reliance Communications launched the world's cheapest phone at Rs 777. In Sri Lanka, a handset costs a minimum Rs 4,000. In most other countries, the minimum price for a handset is $80 (Rs 3,200).

NSE 3rd fastest growing bourse: The National Stock Exchange (NSE) has emerged the world's third fastest-growing exchange in terms of increase in listed companies - outpacing global names such as NYSE, Nasdaq and London Stock Exchange.

"When the history of our time in office is written, I am confident the great strategic leap forward in cementing the Indo-US strategic partnership will count among the most important accomplishments of Presidents (George W) Bush and (Bill) Clinton with Prime Minister (Manmohan) Singh and his predecessors". Nicholas Burns, US Under Secretary of State for Political Affairs

This is booming and bubbling India.

About the Author: *Indra Roy Sharma, better known to his acquaintances as 'IR Sharma' or 'Indra' graduated in Mechanical Engineering from IIT, Kharagpur in 1961. Indra worked with Hindustan Motors for almost 37 years and retired after working as General Manager, Corporate Project Planning in 1997. He also worked as President, Harig Crankshafts Ltd as its President till he underwent heart surgery in 2000. He presently keeps himself busy with his blog www.drishtikona.com. 'Booming and bubbling India" is a series that he publishes on his blog every Monday.*

Transforming Bihar

Madhukar Pandey, New Delhi, India

The real jazz of Indian Economy will commence only when the economies of the States of Bihar, Uttar Pradesh, Orissa, Jharkhand, Chhattisgarh including all such undeveloped economies will perform. The rank of India at Human Development Index may take a galloping jump if these States pick up in Education, Health as well as in Poverty alleviation. Recently the administrative activism and political will of the mentor of Bihar has shown curiosity in all who are watching the most backward State in resurgence process. The way it is transforming, it will be a case study for all the States to pursue the strategy…..

The write up is a small contribution in the bucket of suggestions being received from all corner of the planet for development of a State leading to India Vision 2020.
Part I

1. Transforming Bihar - Brand Equity:

Brand equity matters a lot for an Organisation/Institutions for attracting customer. When a company spends much on promotion of Sports/Brand name, the purpose is clear. It wants to create a positive image in the mind of their targeted customers. For States/Countries willing high value brand equity means more investment in the State. It has always been a practice of the countries which seek to grow fast and transform itself into developed category e.g. Kuwait, UAE in recent days. If the State like Gujarat can attract investment worth Rs. 2.5 lakhs crore in three days Vibrant Gujarat meet, it is just b'ze of their Brand name/positive perception in the mind of investor. Whereas if Bihar has to struggle a lot for an investment of only Rs. 25,000- 30,000 crore during last year, it is only b'ze Bihar needs to build Brand Equity in more aggressive way. States of Kerala, Madhya Pradesh are promoting their tourism sector and it is felt that they are on one hand attracting tourist in their States and on other hand creating a positive image in the people's mind. State Government need to explore the way through which campaign for building Brand image be done. Department of Tourism may take initiative in this direction, which will on one side attract tourists in the State and also bring a positive perception in the people seating outside the State and watching the developmental activities.

2. Transforming Bihar: Human Capital:

As per 2001 Census, population of Bihar is 8 crore (approx) and its literacy rate is only 47%. The situation has not improve and was below average as per the latest Outcome Budget of Department of Education. But it is sure if the human capital of the State is transformed to its true potential, it can bring revolution. The need of the hour is to recognize the areas where more focused approach is needed.

Girls education- 50% of the human capital is lying hidden, if it is properly explored, it can help in doubling the per capita income of the State. More focus must be given on the District where the literacy rate is very low: While going through the census report some of the districts are having very low literacy rate, esp. of female. The Districts with low literacy rate must be properly attended to on top priority basis.

Technical Education: We must realize that per capita income in the States like Kerala is 6-7 times more than the state like Bihar. It is b'ze a large no. of people from these States are working abroad and bring more foreign currencies there. They are in demand b'ze they are more technically skilled. In case of Bihar, most of the people, their first priority is to get a Govt. job, and if they fail, they try to go to private sector. This perception need to be changed. If more no. of people are from IT Sector, Bio-tech, Engineering, Medical they will be more employable in India & Abroad and their earning capacity too will be high. However, Govt. is taking initiative in this direction; technical education in the State needs more attention. Initiative taken by Govt. in Girl education (as there are two new schemes launched by Hon'ble CM) is really commendable

3. Transforming Bihar: Higher Learning Institutions

Every year thousands of Students from Bihar go to Karnataka, Andhra Pradesh or to say

Maharashtra for getting technical education. The reasons, availability of institutions of higher learning in the field of Engineering, Medical, Bio-tech or other fields. Due to Globalisation things are changing fast. Once you are qualified in technical field, getting jobs becomes very easy. But simultaneously if we think other way thousands of crores of money from Bihar is pumped in higher learning institutions in other States. Can we reverse the process? Let there be higher learning institutions in good numbers in Bihar especially in IT/ITES sector education, Medical, Health Services, Financial Sector, Engineering etc. and make the technical education easily available in Bihar. Let there be similar situation as was during Nalanda University, Taxila University. Now the question is how this will be funded. There can be Private- Public Partnership, BOT methodology may be adopted or we can seek long term loan from the World level financial institutions viz. WB, ADB,IMF or any other body. If we maintain quality in the education, things will reverse and the loan taken for creating educational infrastructure may be repaid from the fees collected from the students in Bihar/other states studying in the state.

4. Transforming Bihar: Service Sector:

After the opening of the economy some 15-16 year back, this sector seen a boom and contribution in the GDP from this sector isincreasing day by day. One job in IT/ITES/ other Service Sector may provide additional 3-4 jobs in ancillary services. When IT sector was on boom, people felt that Bombay will take more and get more. But cities like Haryana (Gurgaon), Maharashtra (Pune, Mumbai), Andhra Pradesh (Hyderabad), Karnataka(Banglore), Tamil Nadu (Chennai) were at the receiving end, facilitated the Industry and today one can see the result. The service sector is giving jobs to lakhs of people of countries and simultaneously jobs for semi skilled, rural youth like Drivers, Caterers, Security Guards and other related areas are being created. As per an estimate one job in IT/ITES/Service sector provides 3-4 additional jobs, to other sector. Taking example from the developed countries, we can easily assess that the contribution of Service Sector is very high to the GDP (in some case 70-90%) and less no. of people are engaged in Agriculture sector (in some case 10-2%). In the case of Bihar, if it prospers this Industry with its hard working, intelligent people, it can improve GDP and give Economy of India a momentum.

5. Transforming Bihar: Tourism

Tourism has played a very significant role in building process of many States. We may witness the cases of Goa, Kerala and recently Madhya Pradesh that are attracting good no. of tourists. Countries like Malaysia, Singapore are generating huge fund from this sector. After doing SWOT (Strength, Weakness, and Opportunity & Threat- from Marketing Management) analysis, we can easily assess that Bihar has a huge potential in Tourism, which could not be explored properly till date. If properly chalked out, we may generate a good portion of our GDP from Tourism.

Suggestions: Proper advertisement for attracting Tourist to the State of Bihar needs to be prepared. If needed State Government may tie up with some big travel agencies to attract tourists. As we know 90% of the Buddhist followers are residing in China, Japan, Vietnam, Thailand & Myanmar. The emotional attachment of these Buddha followers with Bodh Gaya can also help in amelioration of India's relation with these neighboring countries. As Japan, China has agreed to fund the developmental projects particularly in roads in Buddha Circuit and somewhere 200 villages will be benefited. This all will depend on the proper plan/strategy for attracting tourists in the State. But it is sure there is huge lying in this sector, which is still unexplored. Madhya Pradesh's "India Ka dil dekho" really impresses. Perhaps the State also need some advertisement for wooing tourists in Bihar.. Although, as reported in Bihar times the number of tourists flocking in Bihar has already increased. It may be desirable that some investment on advertisement about Bihar's tourist places linked with Lord Buddha, Lord Ram, Great Ashoka will certainly multiply the numbers… This will also improve the image of Bihar and also its marketability.

6. Transforming Bihar: Identifying weaker areas:

The overall performance of a class can only improve when the children with poor performance are given more concentration. It is easier too. Suppose a child gets 40% marks in the exam and simultaneously other one is getting 90% marks. The scope of improvement in the score of the child with 40% marks is high with less effort, even if he gets 80%, it means he can add his 40% marks in the total average. Similarly, states like Bihar, Madhya Pradesh, Andhra Pradesh, Rajasthan, Orissa, Uttar Pradesh (these have

been called BIMARU States by Planning Commission) performs on all socio-economic indicator this will give high momentum in the growth of the country. Since they had been poor performer in the past, the scope of improvement is very high. (That is why there is Special Task Force for the Development of Bihar under Mr. Jha and there is monitoring from Prime Minister as well as Planning Commission). Centre has identified 150 backward districts for giving more concentration for development, SC/ST budgeting, Gender budgeting…... That is why His Excellency President going again and again to Bihar and motivating all. Every one knows, if Bihar performs, India will perform. The same can be applied in the case of districts as well, if u select, say 10 districts from the State with lowest Human Development Index (Education, Health, Per Capita Income) and give more concentration, with less endeavor the State can get more, do more. Starting from Kishanganj …..with lowest literate district of the country. We can see in the past, on HDI ranking India dropped from 124 to 127 since there was no expected improvement on the status of Education, Per Capita Income, and life expectancy. The ranking can only improve, only when the State like Bihar, Uttar Pradesh, Orissa.. performs…Government of Bihar may identify 10 most backward districts (some people may mind) not backward rather low on Human development Index or identify some 100 Blocks (starting from lowest HDI) and it should be monitored non other than Hon'ble Chief Minister/ Hon'ble Deputy Chief Minister and every body would agree that things would be visible within a limited span of time.

7. Transforming Bihar: Planned Township:

During last few years, we have seen that many of the States with planned township project have attracted thousands of crores from the people seeking residential/commercial plots/flats. Many of residents from Bihar have invested lakhs of rupees in purchasing flats/plots outside Bihar,which in most of cases will be repaid with their hard earned money for next 15-20 years. Big players in real estates are helping in the infrastructure development of the areas in different parts of the country. Perhaps we don't have such organized player and but there seems that State Government has not planned for wooing investment in the development of township in our State. Yes it is true that the cities of Bihar cannot be compared with Noida/Gurgaon/Mumbai or Delhi but if there are planned townships in the cities like Patna/Greater Patna/Gaya/Bhagalpur or other cities with all facilities like power back up, schools,hospitals, banks and full security provisions, it can be understood that the Non-Residents Biharis will mostly invest back some hard earned money in their State. Tie up with Banks with such schemes as being followed in Haryana/Punjab/Estern UP for finance facility. This will also help in creation of infrastructure as well as creates lakhs of jobs for the residents of the State.

8. Transforming Bihar: Funds for Development:

Funds for development have always been a matter of concern for a State willing to transform. If one goes through the history of some of the developed State, one can easily assess that they have proper plan for generating funds for creating infrastructure, for health, education and other social sector, BIPASA (Bijli, Pani & Sarak). First of all there is a need to improve revenue collection. It has been witnessed in last financial year; tax collection of India has improved substantially. Bihar has a huge potential to improve the revenue collection. Secondly, we have Central Government with so many beautiful schemes with thousands of crores for the development in all areas from Education, Health, Employment, Women & Child development to BIPASA. But it needs optimum & timely utilization, timely submission of the proposals to Centre, tracking & monitoring of the Schemes, proper delegation as well convincing to the centre about the requirement with an assurance that the funds will be utilized properly. Thirdly we have so many world level financial institutions from where funds can be generated by way of grants, loan (long term with low interest rate) e.g. ADB, IMF, World Bank etc. Many a times we have seen that developed States like Tamil Nadu, Maharashtra has signed MOU with these Global bodies for financial assistance for developing infrastructure. Fourthly, we can have Public Private Partnership, also BOT (Build Operate & Transfer) system with private players for creation of infrastructure. Non-residents Bihar may be convinced with future plans of the State with a surety that their investment will have a better rate of return. NGOs, if properly monitored, can be a big helping hand in the development process. We have a bright past, people across the globe are there to help revival of Budha's place, they will certainly come to help in building Bihar.

9. Transforming Bihar: Training & Development of State Employees

Training and development plays an important role in improving productivity of an organization. In the day of competition it is very much desirable that the employees working in an organization are fully trained and motivated so that they can execute the plans & policy of the Institutions. Today, when the role of Chief Minister is changing to CMD (Chief Minister for Development) and District Magistrate to DM (Dynamic Managers) it is essential that the bureaucracy has a Managerial approach towards the welfare of Shareholder i.e. the people and have a clearcut objective in terms of achieving physical targets in literacy, employment, health, infrastructure, poverty alleviation.Similarly, the grass root employees are also required to be trained in operating Computers, dealing with RTI, Public Grievances and should be made understood the importance of their position and the work they execute. State Government must give prime importance in the training and development of their lakhs of employees, at least one month training in an year should be given to every employees so that they can cope up in the era of Liberalisation, Privatisation & Globalisation (LPG) which is going away from the License-Permit-Quota Raj (LPQ Raj).

10. Transforming Bihar- Planting Entrepreneurship:

Aaja tujhko pukare mera Bihar, perhaps this is the tune which Government is singing these days. Whole machinery is working hard to attract investment from the entrepreneurs. Bigger names like Mittal, Ambani, Tata, Birla, Mahindra…. List is long, but if one goes through the transitional phase of the developed States each State has a different Story, has a different Strength. We know Gujarat may have low literacy rate as compared to Kerala but its people's entrepreneurship is ruling the world. The State created such environment for the people so as to find entrepreneurs among them. Today one entrepreneur can help lakhs of people in getting job, generating huge revenues…., the turnover of his company may be multiples of the total budgets of the States. The need of the hour is to create an environment in the State which may help in improving entrepreneur ability among the citizens. Make funds easily available to them for starting business (many Central Schemes are already available), train & develop, encourage, motivate… , improve law & order… create market, …who knows tomorrow the State may have some Mittals, Amabanis, Tatas, Birlas … in its lap.

11. Transforming Bihar: Health Services :

"Ham sabne yah thana hain, swastha Bihar Banana hain" this is the slogan of Department of Health & Family Welfare of Bihar. Exactly, healthy Bihar means, Biharis with more working capacity, maximum of population in working category, more earning…Today, in a Primary Health Centre of a Block one can find that the no. of registration of the Patients has increased on an average to 100 per day (approx.). The Department of Health and family Welfare has constituted State Health Society (At State Head Quarter), District Health Society (District Head Quarter) & Patient Welfare Society (at Block level). Excellent monitoring and control can be perceived as the Government has appointed on contract basis Management Degree holders as Block Programme Manager (BPM), District Programme Manager (DPM) as well as Doctors on consolidated salary ranging from 12000 to 30-40 thousands per month for 1-3 years. The no. of child birth in Hospital has increased as Govt. has enhanced the assistance to the mother from Rs. 1200 to Rs. 1400 and also assistance to ASHA Worker from Rs. 200 to Rs. 300 for bringing them to hospital. Other many officials linked to alleviating Tuberculosis, other disease alleviation etc have been appointed on contract basis. Groups have been formed and have been put on roaster duty so that to provide 24X7 services to the patients as well as to deal with emergency cases. Renovation/reconstruction of the buildings in hospitals with the funds under National Rural Health Mission has been done. New aids/apparatus/appliances have been made available to the hospitals. Medicines are now available to the patients after getting registered with One Rupee Coin. Regular immunization programme on Wednesdays & on Saturdays in rural centers is being monitored and ensured. Funds for construction of hospital buildings are also being made with foreign donation. Many referral hospitals have been renovated and upgraded and there are many things on the card. Let us hope very soon to have a Healthy Bihar. There seems to be need of : More medicines to be available at Block level Hospitals. The personnel appointed on contract basis to monitor the functioning of hospitals, need to be very sensitive, coordinating, motivating, encouraging rather than having stick policy while dealing with the senior doctors/permanent officers. Renovation

of the quarters allotted to the Doctors (these are in dilapidated conditions, not suitable to live in) and other facilities.

To be continued….

About the Author :*This write up has been prepared by* ***Shri Madhukar Pandey****, Central Secretariat Service, Ministry of Human Resource Development, Government of India and the observations are his personal views)*

My Series of Meeting and Discussion on Developmental Issues

Dr. Hari Sharma & Mrs. Aruna Sharma, Sweden

***Abstract** : This is a report submitted to BiharBrains on my series of Meeting with the Hon'ble President of India, The Hon'ble Chief Minister of Bihar, the Hon'ble Dy. Chief Minister of Bihar and the Hon'ble Urban Development Minister of Bihar during First Global Bihar Meet in Patna, Maurya Hotel, January 19-22,2007*

Our Meeting with the Hon'ble President of India HE Dr APJ Abdul Kalam

Place: Bihar Govt. Hanger at Patna Airport
Date: January 19, 2007
Time: 19:30 h
Duration: 10 min.

Aruna & I met HE Professor Dr APJ Abdul Kalam in a very relaxed and pleasant atmosphere for about 10 min. The Hon'ble president was extremely kind and allowed us to sit on the same sofa beside him at the same level and asked for a picture of us together with him to the Presidential Photographer. We are moved by his gesture. We are still fascinated by his kindness and his extraordinary charming personality. He is one the greatest scientists on this earth.

"Me (Dr. Hari Shankar Sharma-right) and My wife (Mrs. Aruna Sharma-middle) with HE-President of India, Dr. A.P.J.Kalam(left) in Global Bihar Meet, Patna on Jan 19,2007

The President asked in details about my research and co-operation at International level and suggested to do some collaboration with National Brain research Centre, Manesar. In this regard, He asked me to send some books, papers and other information to him on the presidential website through e.mail so that he can make contact with the Director of NBRC at Manesar regarding a possible collaboration with Swedish research. The Hon'ble President listened us very patiently about our ambition in research and also made some kind suggestions.

During the Discussion, the president said to me that he never visited Sweden and thus I invited him to visit my hospital and University. On which we are working now. In March 2006, I reminded him that I invited you to inaugurate my congress, 3rd International Conference of the Global College on Neuroproetction and Neuroregeneration, Uppsala, March 1-3, 2006 that he remembers. At time I was informed from his office that the President can't come to Sweden due to his time-constraints and thanks you for such invitation.

During our discussion, the Hon'ble president in lighter vein told me that you and I are both working in same field, i.e., we are scientists except our working fields are different. On this comment, we said that meeting high level scientists like you is just feeling to see "God" as we revered this profession (science) and you are the master of this in your field. When we told him that we realize your hard work at that time when there is almost non-existing facilities in our country, thus your work is utmost great and precious that many other people in this area who started work in good environment and with good facilities. The President readily accepted this with smile on his face.

At the end, the Hon'ble president stood up and shook hand with me and placed his both hands on Aruna's crown and said "God Bless you". This was our most emotional moments with HE President.

The meeting was ended to find ways of having scientific collaboration with Indian Institutes related to our field of work. As a follow up we have sent all the necessary details that the Hon'ble president asked me to send to him. We

are eagerly waiting for some advice and communication from him.

In this regard, it is worth to mention that President from time to time communicates with me when we exchanged "New Years Greetings" from Sweden or USA. Those emails that have been received by me from the president himself are the priceless treasure for us. We are in communication with HE president since 2002. Currently, through Swedish diplomatic channel and Swedish Govt. we are working to invite the Hon'ble president to Sweden at his convenience.

Our Meeting with the Hon'ble CM Shri Nitish Kumar

Place: CM residence, 1 Anne Marg, Patna 800001
Date: January 19, 2007
Time: 12:30 h
Duration: 7 min.

Aruna & I met the Hon'ble CM on the sidelines of Lunch meeting with delegates of Global Meet. The Hon'ble CM is a very soft spoken, simple and extremely intelligent person. When we told him that "today" our Bihar is proud on him and on the path of development due to your policies and able administration in such a short time, he only smiled and said: "this is a collective effects of my Government" with the help of law abiding citizens!

The CM also said that his main thrust to develop Bihar is to provide quality Education and Research in every sphere, thus development of new Institutions on the International line is our priority. We told him that Sir, please visit Sweden (as I have also invited him earlier to inaugurate my International Conference on GCNN in Uppsala, http://www.gcnpnr.org March 1-3, 2006) to see Swedish style of functioning of Education and healthcare Organization are entirely different from USA and UK, he told us to send relevant information to him so that he can have some input to take some decision. Regarding development of an International Quality of Medical research Centre on my own land in Dalmianagar as "Built & Transfer" to Bihar Government, we exchanged some positive ides about this. During our brief interaction, he also asked personal questions about our well being and promised to do a better organization of Global Bihar Meet 2nd time when Govt. Participation will be stronger. He also mentioned to us that the idea of this meet is not to have just investment, but to show the changing face of Bihar in good terms to the World. In this aspect the CM has achieved great success. He was so kind that he offered all his help to see him during the meet anytime, if we have anything further to say or we have any problem. This really makes us very emotional. We can say only that our CM is a Great Human Being and has very kind heart, a rare thing that is seen now-a days in politicians and administrators. Our State is firmly secured in the hand of our honest and hard working CM.

Hari & Aruna with the Hon'ble CM Shri Nitish Kumar at his Official residence

We are now working as a follow-up to provide necessary feedback to our Hon'ble CM and to invite him to Sweden through Swedish Govt. so that his visit to Sweden (at his convenience) will be highly successful for the development of Bihar.

Our Meeting with the Hon'ble Deputy CM Shri Sushil Kumar Modi

Place: Maurya Hotel
Date: January 20, 2007
Time: 13:30 h
Duration: 5 min.

During a lunch break on January 20, Aruna and I met the Hon'ble Dy CM for an interaction that lasted over 5 min. Interestingly the Dy CM recognized us during a brief chat at CM residence on January 19th. Aruna and I invited him to Sweden to see the Educational Institute and to visit the Swedish National Agency for Higher Education, a Swedish Govt. Organization that the Dy. CM has accepted kindly. He asked about number of Behari migrants in Sweden, but also mentioned that this doesn't matter, as we need quality of Education and Infrastructure. The Dy CM is also very keen to change the educational standards of Bihar in a positive way.

The Dy CM is very kind to allow us for a photographic session in the lawns of Hotel Maurya.

The Hon'ble Dy. CM Shri Sushil Kumar Modi with Hari & Aruna at Maurya Hotel lawn, Patna

On a personal note, he noticed us from the dais that we are standing behind the audience and asked that why you were standing behind the audience? There were several vacant seats in the front row. You are most welcome to seat wherever you find place. This personal observation of Dy CM even sitting on the dais has really touched our emotional chord. This shows that our Dy CM is such a sensitive, kind and nice persons that we have seen by ourselves. We feel that our lovely state, Bihar is very secured under the guidance of Dy CM.

Our Meeting with the Hon'ble Minister Shri Ashwani Kumar Chaube

Place: CM residence, 1 Anne Marg, Patna
Date: January 19, 2007
Time: 13:00 h
Duration: 10 min.

We have good time at 1 Anne Marg during the lunch meeting where we met the Hon'ble Minister Shri Ashwani Chaube jee on the lawns. He is a very kind and polite person. He already recognized us from our Bio-Data sent to Bihar Global Meet and initiated discussion about future of Bihar. When we stated that we are here to show our education and Hospital functioning from Sweden because this is the "need of the hour" for Bihar. The Swedish system for healthcare and education is cheap, affordable and practical for our people of Bihar. He really moved by this and told us that he look forward to his visit to Sweden where he can see and discuss a lot more including the development of City and infrastructure for Bihar. The Hon'ble Minister has very kind words to Aruna and said that if we get the support of "Bhabhi jee" then why not we can emulate the educational and health model of Sweden in Bihar and also to plan infrastructure according to Swedish urban style. Such ma personal note from the Hon'ble minister is amazing.

He was very generous to have photo session with us.

The Hon'ble Minister Shri Ashwani Kumar Chaube with Aruna & Hari at CM Residence, Patna.

Now we are working through Swedish Govt. channels to invite our Hon'ble dignitaries from Bihar Govt. to Sweden where we will have project presentation and we will arrange meetings with the Rector of Uppsala University, Directors of University Hospital apart from Members of parliament from Swedish Govt. Our plan is also to arrange a meeting with Respective miniseries of Swedish Govt., when our Hon'ble CM, Dy CM and Ministers of Bihar Govt. will undertake their visit to Sweden.

Let's hope, to build a new Bihar with all modern facilities and good infrastructure in a professional and transparent way.

About the Authors: *The author **Dr.(Prof) Hari Shankar Sharma** is professor of Neurobiology, Department of Surgical Sciences Apartment 28 Anesthesiology & Intensive Care Medicine University Hospital, Uppsala University*
He is also Chief/International CNS Injury Research Group,UU AND Editor in Chief, International J Neuroprotection & Neuroregeneration (IJNN, UK)
***Mrs. Aruna Sharma** is wife of Dr. Hari Shankar Sharma and working for same dept in uppasala University, Sweden.*

National Institute of Technology, Patna,- Is it a Temple of Learning or it continues to be the happy hunting ground for the powers that be?

Dr. Bijay Kumar Sharma, Patna, India

Today the stated objective of NDA Government in Bihar is to create an Educational Environment in Bihar whereby students are not compelled to leave their state for their education-higher Education or otherwise. But what is the ground reality?

Let us take the example of NIT, Patna, which was Bihar College of Engineering, Patna, till 28th January 2004. Electronics and Communication Department of Bihar College of Engineering, Patna, was born by a Senate resolution in 1984. By 1990 the financial approval was obtained from DST, Bihar, for the same.

Like any other Engineering College of Bihar, BCE had a serious shortage of Teaching Staff, Technical Staff , Equipments and Floor Area. The reason assigned was the shortage of funds and State Government Support.

With a lot of expectations and hopes, NDA Government took special initiative in transforming Bihar College of Engineering into National Institute of Technology totally financed by the Center. Today almost 3 years have passed after the transformation from BCE to NIT still no qualitative improvement has taken place as shown by the Table below. Infact there has been a definite deterioration in the overall academic standards since January 2004 as is evident from the ranking given to NIT, Patna, in 11th June OUTLOOK Magazine. (89th amongst all Engineering Colleges and 50th amongst the Government Colleges).

The following Table shows what has happened since 1990 to 2007.

As you all can see that our Academic load has increased excessively but the floor area, resources and faculty positions have not correspondingly increased. As a result it is impossible to maintain any kind of Academic Standards.

In fact in the past Academic Year (2006-07) serious compromises have been made in meeting attendance criteria, final year project criteria and laboratory training criteria.

This year if the above scenario in terms of infrastructure and teaching & technical personnels is not radically changed then it will become impossible to maintain any kind of Academic Standards and we will be distributing just paper degrees.

The remedy for this continuous deterioration of Academic Standards is the following:

1. A high power committee consisting of Director and HOD's should be formed to set the priorities right and specifically address the Academic Problems;
2. Till now Academic Problems have been totally ignored;
1. Atleast 75% of the Lab requirements in terms of Floor Area and Equipments should be installed;
2. 75% of required staff strength (both teaching and technical)should be recruited;
3. After meeting the above two conditions only the new Academic session 2007-08 should be resumed.

In this regard State Government has to play a critical role. It must appoint Political Commissars in all the Universities of Bihar and in Centrally Aided Institutes and see that the priorities are set right and due attention are paid to the matters of Academic Standards and the Sanctity of Examinations. Only after the Government plays a proactive role that the downward deterioration of educational standards can be checked and reversed in due course of time.

About the Author*: Dr. B. K. Sharma is HOD, Dept of Electrical & Communication Engineering, National Institute of Technology, Patna. He can be reached at nitp_placement@yahoo.com*

	During BCE period 1990- 2003 December	NIT establishment and after	Actual Requirement
Students to be taught by ECE per year	20(ECE)+ 20(EEE)+ +60(ME)=100	60(ECE)+60(EEE)+60(ME) +60(IT)+60(CSE)= 300	3 fold increase
Faculty Position	3	3	15 required
Floor Area for Labs	2620 sq.ft	2620 sq.ft	4000 sq. ft
Floor Area for Computer Lab	1000 sq ft	1000sq ft	1500 sq ft
Investment in Lab equipments	2 lakhs	12 lakhs	1 crore
Investment in Computer lab	5 lakhs	5 lakhs+15lakhs	Softwares worth 20 lakhs immediately required.

Hats Off People's President

Bibhuti Bikramaditya, Seoul, South Korea

This article is devoted to non -other than our beloved Dr. APJ Kalam who made history by his vision of India 2020 and advocated action plan to develop India into **"Knowledge super power** "and into a **"developed nation by 2020**"; who made history as missile man of India and was brain child of Nag , Prithvi Akash, Trishul, Agni and several other projects being heads of around 50 R&D Institutes; who made India a nuclear power and was leader during Shakti-98; who gave **mantra for educated politicians** (unfortunately not approved by the parliament) to rule over the country; who when gave little smile, all children's of India bestowed exhilarating love and the last but not the least he is who gave vision for the development of Bihar and stated that the development of Bihar leads to the development of the nation.

In his entire mission, I saw him very much clear to his points. Once he advocated policy of educated politicians. Though it was rejected as it was not suited to political circle of India for the well known reason but certainly his advocacy will start discussion among educated circle of India.

In his entire term, he worked for pioneering S&T in India, in his foreign tour too, he visited labs of the country and met scientists and professors. His extra ordinary love towards children was also admired by all countries where he visited. They all arranged special program in schools where he met with children.

In the implementation of his project ideas, sometimes he went out of the way too. The best example is Bihar. In Bihar, he visited two times

and addressed joint session of parliament, gave full support to present Hon'ble CM of Bihar for the implementation of projects in Bihar, openly gave 10 points formula to develop Bihar by Power point presentation while inaugurating Global Bihar Meet, 2007. This was his unique style of functioning and we are proud in ourselves by the seeing the attitude of this high tech president. In recently concluded global Bihar Meet in Jan 19-21, 2007 at Patna, he gave a surprise by giving his confirmation by one simple mail from one of the organizer (there was no official mail from the govt).On the basis of that mail, he wrote to the state government and asked it to arrange his programme.That a President took cognizance of a casual letter so seriously and that too on such a short notice shows his interest in Bihar, the state with which he had no past record of association.

His mission and vision towards the development of Bihar will be always remembered particularly for two projects which he initiated 1. Revival of Nalanda University and 2. Establishment of IISER,, Indian Institute for Science Education & Research. He advocated for both of these institutes in Bihar in his entire visit to Bihar.

I am personally very happy to see the progress made for the revival of Nalanda University which has become now cynosure of all political and non political circle and landmark for building strong relation with china.This is welcome event that many Buddhist country have offered their contribution for the revival of the said university and more than that we praise Prof Amartya sen for taking responsibility of the university.

The development process of establishment of IISER is very slow as matter has already been raised by BiharBrains (http://www.biharbrains.org/bihar-brains-demand-NISC-IISER.php) for which separate blog has been created in association with Dept of S&T ,Govt of Bihar. Please visit blog www.bbiiser.blogspot.com . Now the good news is that Dept of S&T, Bihar has taken now serious note of it and started work on it and joined hands with BiharBrains for the noble cause. This is to mention here that the establishment of IISER will bring R&D environment into track in Bihar. I do hope govt will pay more attention to this project too in the near future.

Anyway If Bihar got implemented both of these projects and become develop state of the nation in the long run, the contribution of Dr. Kalam will be remembered by respect and as messiah for Bihar.

Let me hats off towards noble work of this people's president and expect words of praise from all section of the society.

Bibhuti Bikramaditya
Chairman, BiharBrains
www.biharbrains.org
Seoul, S. Korea

Symbolism in Hinduism

Gyan Rajhans, Canada

A symbol is a conventional sign employed to convey a meaning. In various religions God is depicted by various symbols. The use of symbols greatly helps us to understand the Infinite Almighty God. One needs a clear, unbiased mind to comprehend the truth behind symbols. An organized study of symbols takes us to another concept, that of Symbolism. Symbolism is the representation of something moral or spiritual by something natural or material.

In Hinduism, the symbols have been used from time immemorial. Most of the symbols of Hinduism are derived from the Vedas. Symbolism is an important way in Hinduism for realization of divine knowledge. But, the science of symbolism has not been laid down, principle-wise, openly in any of the Hindu scriptures. It has to be patiently, devotedly and humbly studied. The degree and the manner in which this science has been imparted and understood have varied according to the capacity of those who have received it. There are many opinions about and explanations of such symbols. Even famous idols and images vary on the point of detail. In this article I will attempt to give you the detailed meanings of three major symbols used in Hinduism.

Om or Aum

Om or Aum is of paramount importance in Hinduism. In my article on The Gayatri Mantra published on www.hinduism.com I have given the detailed explanation as to why this syllable represents Brahman, both the unmanifest and manifest aspects of God and why it is called *Pranav,* which means that it pervades life through our *Prana* or breath.

In this article I am providing the scientific significance of its geometrical shape. As seen above the symbol of Om or Aum consists of three curves, one semicircle and a dot.

The large lower curve (**1**) symbolizes the waking state, in this state the consciousness is turned outwards through the gates of the senses. Its larger size signifies that this is the most common ('majority') state of the human consciousness.

The upper curve (**2**) denotes the state of deep sleep or the unconscious state. This is a state where the sleeper desires nothing nor beholds any dream.

The middle curve (**3**) signifies the dream state. In this state the consciousness of the individual is turned inwards and that is the reason for this curve shown pointing towards the other two curves.

These are the three states of an individual's consciousness, and since Hindu mystic thought believes the entire manifested reality to spring from this consciousness, these three curves therefore represent the entire physical phenomenon.

The dot (**4**) signifies the fourth state of consciousness, known in Sanskrit as turiya. In this state the consciousness looks neither outwards nor inwards, nor the two together. It signifies the coming to rest of all differentiated and relative existence. This utterly quiet, peaceful and blissful state is the ultimate aim of all spiritual activity. This Absolute (non-relative) state illuminates the other three states.

Finally, the semi circle (**5**) symbolizes maya (cosmic illusion) and separates the dot from the other three curves. Thus it is the illusion of maya that prevents us from the realization of this highest state of bliss. The semi circle is open at the top, and when ideally drawn does not touch the dot. This means that this highest state is not affected by *maya*. *Maya* only affects the manifested phenomenon. This effect is that of preventing the seeker from reaching his ultimate goal, the realization of the One, all-pervading, unmanifest, Absolute principle. In this manner, the geometric

shape of OM represents both the unmanifest and the manifest.

Swastika

It is a symbol of a symbol of auspicious knowledge. The term *swastika* emanates from the Sanskrit word *swasti* = *su* (good) + *asti* (being).
As you can see above, *swastika is* a line-design invented by the Vedic sages. Its specific geometry is believed to have some relation with certain natural energy fields. It is drawn as a cross with equal arms when all the arms are continued as far again at right angles clockwise.

The sublime effects, in terms of the cosmic energy currents superimposed in the unique pattern of *swastika,* correspond to what the *swastika* symbolizes -- auspiciousness, well-being. The clockwise direction is of significant importance, as it also happens to be the direction of movement (as we see it on the earth) of the sun, which rises in the east and sets in the west. The four sides of the *swastika* thus represent the four principal directions.

The symbol of *swastika is* being used as a holy sign in India since the time of yore. Scriptural descriptions define it as a divine symbol that encompasses (in coded form) several important meanings and mysterious formulae or signs representing specific energy cycles in the universe. In some scriptures, four divine powers governing the physical system of Nature are said to be subtly present around its four sides. Scholars of Vedic literature also interpret the *swastika* symbol as the coded design of the electro-magnetic / magnetic energy fields around the solar system's nucleus.

The Poorna Kumbha

Poorna Kumbha literally means a 'full pitcher' (Sanskrit: '*poorna*' = full, '*kumbha*' = pot). The *Poorna Kumbha*, as you can see above, is decorated with the design of *swastika* and filled with water, and with fresh mango or betel leaves and a coconut atop it. It is generally placed as the chief deity or by the side of the deity before starting a Puja (Hindu worship). The pot symbolizes mother earth, the water symbolizes life-giver, the leaves symbolize life and the coconut symbolizes divine consciousness. Commonly used during almost all religious rites, the pitcher with *swastika* on it also stands for auspiciousness and harbinger of good fortune.

The above three are universal symbols widely used in Hinduism. In addition, each Hindu God and Goddess has many characteristics, like dress, 'vehicle', weapons, etc., that are themselves symbols of the deity's power. For example, *Brahma* holds the Vedas in his hands, which signifies that he has the supreme command over creative and religious knowledge. *Vishnu* holds a conch which stands for the five elements and eternity; a discus, which is the symbol of the mind; a bow that symbolizes power and a lotus which is the symbol of the cosmos. *Shiva's* trident represents the three *gunas* (qualities inherent in human beings). Similarly Krishna's flute symbolizes divine music.

To sum up, a symbol in Hinduism is the objective representation of a subjective idea.

About Author: *Gyan Rajhans, an internationally recognized heath & safety professional has been broadcasting the only non-commercial Vedic religion radio program in North America since 1981 & worldwide web cast on www.bhajanawali.com since 1999. Mr. Rajhans has published extensively on religious and spiritual matters. Some articles are available on the Bhajanawali web site. He has translated Sri Mad Bhagvad Gita in English for the younger generation. Mr. Rajhans has been conferred various titles, including that of Rishi by Hindu*

Prarthana Samaj of Toronto Hindu Ratna by Hindu Federation of Toronto. He received Canadian Journalists' and Writers' Club (CEJWC) award for 2005 in the Internet category - Opinion - for his Spirituality columns in South Asian Outlook e-Monthly.]

Korean Sauna

Dr. Manis Kumar Jha, Daejeon, South Korea

Dr. Ramlochan Pandey is working as a brain pool scientist in South Korea. He is very happy and always be anxious to know all about the Korea. He used to be going every where with his boss. In summer generally Koreans go to 'Sauna' for bath. There are many different grade of bath arrangements namely, Sauna, jhinjhil ba..etc. Scientifically, these arrangements and baths are very good for health and freshness. First of all you have to take baths with soap, and then will have to go in water pool of 30 degree temperature, then 40 degree then more and cold like that…to make your body cleaner. Even the use of hot and cold water one by one clear the pore of the human skin. After that you have to pass through many medicated and herbal water and steam baths. And then you have to go for drying your body and like that. Then you have to sit with a news paper or watching movies for final drying of your bodies. After that you will really feel energetic and fresh.

So after getting this type of feed back about the bath in SAUNA from his boss, Dr. Pandey became ready to take bath in that expensive Sauna. On arrival to Sauna, his boss paid 18,000 Won in counter for two peoples, which was around 19$. They got two keys of different cupboards for keeping their cloth separately. His boss immediately wore off his all cloths, bound the key in his leg and entered for taking bath. For a moment, Dr. Ramlochan Pandey became nervous to see his boss in totally nude state. But, there were no way so he entered in that bath with underwear. But immediately, a people sought on him and told him please go out and open that wearing also. Dr. Pandey thought if he will not do like that, they will think Dr. pandey is very backward. So he has followed his order. But tried to hide with a towel but that was like handkerchief. So it was impossible to use that towel any more. Inside the Sauna all people were in similar mode like his boss. Yes it was really strange for Dr. Pandey, so by taking bath within 2-5 minutes he came out. When he came out he found many people were reading news papers for drying their body. Oh…..Dr. Pandey immediately wore all the cloths and went near the car of his boss, which was on road. His boss came out after 45 minutes in fresh mood. Boss asked "How are you Dr. Pandey??". Dr. pandey told fine. How was the SAUNA? Dr. Pandey told "As in India this type of nude bath is not accepted socially, so I have seen this Sauna first time in my life, but I have to adjust slowly.

Some Facts About Firsts

Lalit Chaudhary, New Delhi, India

The first telephone book ever issued contained only fifty names. It was published in New Haven, Connecticut, by the New Haven District Telephone Company in February, 1878.

The first toothbrush with bristles was developed in China in 1498. Bristles were taken from hogs at first, later from horses. The nylon bristles were developed in 1938 by DuPont.

The first toy product ever advertised on television was Mr. Potato Head®. Introduced in 1952.

The first translation of the English Bible was initiated by John Wycliffe and completed by John Purvey in 1388.

The first triple jump in figure skating competition was performed by Dick Button in 1952.

The first U.S. patent for an animal was issued to Harvard University in 1988 for an oncomouse, a genetically engineered mouse that's susceptible to breast cancer. It's used to test anti-cancer therapies.

The first US consumer product sold in the Soviet Union was Pepsi-Cola.

The first US Marines wore high leather collars to protect their necks from sabres, hence the name "leathernecks."

The first US Patent was for manufacturing potassium carbonate (used in glass and gunpowder). It was issued to Samuel Hopkins on July 31, 1970.

The first US president to both be sued for sexual misconduct and forced to give a deposition while in office was William Jefferson Clinton.

The first Wimbledon Tennis Competition took place in 1877 solely as an amateur competition. Men's singles was the only event that took place. There were 22 competitors and the championship was won by Spencer Gore.

The first woman in Congress was Jeanette Rankin of Montana, in 1917.

The first woman to qualify for the Indianapolis 500 was Janet Guthrie in 1977.

The first woman to run for President was Victoria Woodhull, on the Equal Rights Party ballot in 1872.

The first words that Thomas A. Edison spoke into the phonograph were, "Mary had a little lamb."

The first written account of the Loch Ness Monster, or Nessie, was made in 565AD.

The first-known contraceptive was crocodile dung, used by Egyptians in 2000 BC.

The first-lady of the U.S. is considered a private citizen.

The fist product to have a bar code was Wrigley's gum.

The five interlocking Olympic rings are black, blue, red, green, and yellow because at least one of these colors appears on every national flag.

The five most frequently used letters in the English alphabet are, in order, E T A I S.

The five most populated cities in the world are, in order, Tokyo-Yokohama (Japan), Mexico City (Mexico), Sao Paulo (Brazil), Seoul (South Korea), and New York (United States).

The flag of the Philippines is the only national flag that is flown differently during times of peace or war. A portion of the flag is blue, while the other is red. The blue portion is flown on top in time of peace and the red portion is flown in war time.

The flag of the Philippines is the only national flag that is flown differently during times of peace or war. A portion of the flag is blue, while the other is red. The blue portion is flown on top in time of peace and the red portion is flown in war time.

The flavor we think of as bubblegum is a combination of wintergreen, vanilla and cassia, a form of cinnamon.

The flea can jump 350 times its body length. It's like a human jumping the length of a football field.

The fleshy projection above the bill of a turkey is called a snood.

The following is said to be the toughest tongue twister in the English language: "sixth sick sheik's sixth sheep's sick".

The football huddle started at Gallaudet University (the world's only accredited four-year liberal arts college for the deaf) in the 19th century when the football team found that opposing teams were reading their signed messages and intercepting their plays.

The forth railway bridge is a meter longer in summer than in winter due to thermal expansion.

The Four Freedoms by Norman Rockwell are the most widely reproduced and distributed paintings in history.

The four highest grossing movies of the 1940s were all animated motion pictures by Disney (Bambi, Pinnochio, Fantasia, and Cinderella).

The Four Horsemen of the Apocalypse, named in the Bible's Book of Revelation, are Conquest, Slaughter, Famine, and Death.

The Four Horsemen of the Fighting Irish of Notre Dame played together for the last time in 1925, as the Irish downed Stanford in the Rose Bowl, 27-10. The Four Horsemen were Jim Crowley, Elmer Layden, Don Miller and Harry Stuhldreher.

The four principal characters from the cartoon series "The Chipmunks" are Alvin, Simon, Theodore, and Dave.

The fragrance of flowers is due to the essences of oil which they produce.

The French philosopher, Voltaire, reportedly drank fifty cups of coffee a day.

The Fresh Kills Landfill on Staten Island, NY opened in 1948 and is the world's largest landfill. It covers 3,000 acres and receives 14,000 tons of garbage a day. It's scheduled to close in 2002.

The Fresh Kills Landfill site on Staten Island, New York, opened in 1948, is the world's largest. It covers 3,000 acres and receives up to 14,000 tons of garbage a day. It is scheduled to reach capacity and close by the year 2002.

The fruit of the Cacao tree grow directly from the trunk. They look like small melons, and the pulp inside contains 20 to 50 seeds or beans. It takes about 400 beans to make a pound of chocolate.

The full name of Harriet Beecher Stowe's novel Uncle Tom's Cabin is actually Uncle Tom's Cabin; or, Life Among the Lowly.

The full Spanish name of the city of Los Angeles is "El Pueblo de Nuestra Señora la Reina de los Angeles de la Porciuncula." Translated, it means “The town of Our Lady the Queen of the Angels of the Little Portion.”

The fungus called truffles can cost $800 to $1,500 per pound. They are sniffed out by female pigs, which detect a compound that is in the saliva of male pigs as well. The same chemical is found in the sweat of human males.

The furthest point from any ocean would be in China.

The fuzz on a tennis ball is intentionally included as a way to give the ball some definite action when it hits the court. It also slows the flight of the ball through the air.

The game of volleyball was invented in 1895 by William G. Morgan.

The Garfish has green bones.

The gases emitted from a banana or an apple can help an orange ripen. (Not sure which fruits are concerned).

The gazelle is a kind of antelope.

The gender of Reptiles are determined not by the sex genes, but by the temperature in which the egg is incubated. A certain temperature will produce a male and vice versa for a female.

The genre of art known as Cubism derived its name from a belittling remark made by Matisse in reference to a Graque painting. Matisse said that the landscape looked as though it were wholly made up of little cubes.

The Genus and species of a gorilla are Gorilla gorilla.

About the author: *Sri Lalit choudhary is webmaster in New delhi based IT company and also he give his service for BiharBrains community website www.biharbrains.org he can be reached at lalitchoudhary_1978@yahoo.com*

Some Interesting Discoveries in Internet

Compiled by Sri Satish Kumar TVS, Seoul, South Korea

1991

AUGUST 6 : www was created by Tim Bernsley.

DEC 12: first server started in america..

1993

APRIL 23 : Browser mosaic released in market to work on windows operating systems

APRIL 30 ; web was made available to all.

MAY ; first magazine on net The Tech was created by Massachussets institute of technology.

JUNE: HTML -Hyper Text Markup Language was released

NOV: Web cam was created

1994

FEB ; YAHOO was created by two stanford university students David Filoo and Jerry Yang. First it was called 'Jerrys guide to world wide web'.YAHOO means Yet Another Hierarchical Officious Oracle

OCT 13 ; Americal official website www.whitehouse.gov was started by president Bill Clinton

OCT 25 ; commercial advertisements started on internet.

1995

FEB ; first radio station on internet started its 'radioHK'

JULY 1 ; Amazon.com ws started for the sale of books online

JULY 4 ; hotmail - email service started

AUG 24 ; internet explorer was launched as a part of windows 95 operating system.

DEC 15 ; multilingual search engine alta vista started

1996

AUG ; this month world wide websites reached 3,42,081

1997

DEC 17 ; web commentator JornBorger created weblog which became Blog later on

1998

SEP ; the Google company was started in a garage in california.

FEB 7 ; eight prominent websites including yahoo and CNN were closed due to hacking

2001

FEB 15 ; jimmywales released online enscyclopedia --wikipedia.

2003

APR 28 ; apple company 'itunes' started

2004

JUN ; web creator Timbernsley was given Britain white hood

NOV 9 ; due to oensourcing revolution morzilla firefox was released

2006

AUG ; the total number of websites on net is 9,26,15,362,,,,,

can u guess what's this number.....

in next three years there would be this much new websites r going to start.....

About the Author: *Sri Satish Kumar TVS is Project manager in Multimedia & Broadcasting division of ITmagic Co.,Ltd, Seoul, S korea. He can be reached at satish_tvs@yahoo.com*

Recent News and Breakthrough

Compiled by Dr. Mohammad Abul Farah, Seoul, South korea

Major Revolution in Regenerative Medicine

Findings described in a new study by Stanford scientists may be the first step toward a major revolution in human regenerative medicine—a future where advanced organ damage can be repaired by the body itself. In the May 2007 issue of The FASEB Journal, researchers show that a human evolutionary ancestor, the sea squirt, can correct abnormalities over a series of generations, suggesting that a similar regenerative process might be possible in people.
"We hope the mechanisms underlying this phenomenon will ultimately lead to new insights regarding the potential of cells and tissues to be reprogrammed and regenerate compromised organs in humans," said Ayelet Voskoboynik, Ph.D., of Stanford University and first author of the study.

Missing limbs, scarred hearts, broken spines, and wounded muscles always try to repair themselves, but often the result is invalidism or disease. Even some tumors try to revert to normal, but are unsuccessful. If the genetic sequence described in the sea squirt applies to humans, this study represents a major step for regenerative medicine.

The sea squirt is more closely related to humans than many would expect. It may appear similar to a sea sponge, worm, or plant, but it is actually not closely related to any of these organisms. Sea squirt larvae have primitive spinal cords, distinguishing them in the greater chain of life and on the evolutionary ladder. Specifically, sea squirts, like humans, belong to a group of animals called chordates (organisms with some level of spinal cord development), and many scientists believe that sea squirts approximate what the very first human chordate ancestor may have been like 550 million years ago. By studying this modern day representative of our evolutionary ancestor, researchers are able to identify fundamental principles of complex processes, such as healing and organ regeneration, on which new treatments are based.

"The aim of biomedical science is to understand life so we can defend our bodies against injury, deformity, and disease. The ultimate medical treatment would be to change an abnormal organ or tissue back to its vibrant, normal state," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "This study is a landmark in regenerative medicine; the Stanford group has accomplished the biological equivalent of turning a sow's ear into a silk purse and back again.
Source : Federation of American Societies for Experimental Biology

Molecules Line Up To Make The Tiniest Of Wires

As technology gets smaller and smaller, the computer industry is facing the complex challenge of finding ways to manufacture the minuscule components necessary. "Computer chips are constantly getting smaller and smaller. There's an unrelenting decrease in size. And the question arises, how do you wire these things in?" said Dr. Jillian Buriak, University of Alberta professor and senior research officer at the National Institute for Nanotechnology. "If you're going to make something on the order of 22 or even 18 nanometres, then you'd better have a plug that's about that size, too."

A team of NINT researchers, headed by Buriak, has demonstrated an innovative technique for producing very small conductive nano-wires on silicon chips. The process can produce nano-wires that are 5,000 times longer than they are wide. The innovative technique for producing very small conductive nano-wires on silicon chips meets the need for connecting ever-smaller transistors and other electronic components.

"You need very tiny wires to connect everything," said Buriak. "We've figured out a way to use molecules that will self-assemble to form the lines that can be used as wires. Then we use those molecules as templates and fill them up with metal, and then we have the wires that we want. You use the molecules to do the hard work for you."

In one example, 25 parallel platinum nano-wires were made using this self assembly process, with each wire measuring only 10 nm in width, but extending to a length of 50 microns.

While the idea of wires 'self-assembling' sounds like something from science-fiction, it's a natural process, says Buriak.

"You are the product of self-assembly. The way DNA forms a double helix is self-assembly. It's just that molecules will recognize each other, bind to each other and then they'll form structures," she said. "And the molecules we're using are actually very simple. They're just polymers, just plastics that do that naturally."

While the new process could provide the solution for computer manufacturers looking for ways of increasing the speed and storage capacity of electronics, it could also mean cheaper electronics as well.

"If you have to go and lithographically define one single wire, it's going to be painstakingly hard and expensive," said Buriak. "But, if you can have a cheap molecule do it for you, that's great, that's going to be much cheaper, use much less energy and be a little more environmentally friendly."The research findings are published in the journal Nature Nanotechnology.

Note: This story has been adapted from a news release issued by University of Alberta.

Potential Future Treatments for Spinal Cord Injuries

When spinal cord injuries occur, the nerves that are injured can cause further damage to healthy neurons due to a process called demyelination. But studies conducted by scientists on 97 rats found that transplantation of specific cells of the rats own brain soon after the injury (two weeks), led to a gain in coordination and the ability to bear weight on their hind limbs. While previous studies have shown similar results, the difference is that embryonic cells weren't used but the animals own neural precursor cells.

The animals didn't recover the ability to walk completely normal, but the results were very promising. They hope that this could also be done in humans one day. One current obstacle for these scientists though, is finding a way to treat those who have been paralyzed for much longer than 2 weeks. When the researchers transplanted the cells in mice with 8 week old injuries, they didn't see the marked improvement in the mice they had seen with the transplants at 2 weeks. Looks like the researchers will have their work cut out for them, but thanks to their hard work and dedication, maybe it will lead to a treatment for paralysis one day!

The original journal article is:
J Neurosci. (March 29 2006) 26(13):3377-89 *Delayed transplantation of adult neural precursor cells promotes remyelination and functional neurological recovery after spinal cord injury.* Karimi-Abdolrezaee S, Eftekharpour E, Wang J, Morshead CM, Fehlings MG.

Scientists Get a Real "Rise" Out of Breakthroughs in How We Understand Changes in Sea Level

For the first time, researchers have the tools and expertise to understand the rate at which sea level is changing and the mechanisms that drive that change. Sea levels rise and fall as oceans warm and cool and as ice on land grows and shrinks. Other factors that contribute to sea level change are the amount of water stored in lakes and reservoirs and the rising and falling of land in coastal regions.

Image: *Oceans change. Beyond merely the sloshing of waves that we all recognize along the beaches of the world, sea level describes a complex array of conditions, from chemistry to temperature to changes in the shape of the basins that hold the world's water. In this visualization, we look at changes in sea level measured from space using data from the TOPEX/Poseidon and Jason satellites. Credit: NASA*

From the Mississippi Delta to the Maldives Islands off the coast of India to the multitude of other low-lying coastal areas around the world, it's estimated that over 100 million lives are potentially impacted by a three-foot increase in sea level," said Dr. Waleed Abdalati, head of the Cryospheric Sciences Branch at NASA's Goddard Space Flight Center, Greenbelt, Md. "This is an ideal time, during the midst of an historic year of both related natural events and research developments tied to this critical global issue, to talk to the public about whether ice in our polar regions is truly melting, whether our oceans are indeed rising faster, and what these changes may mean to us."

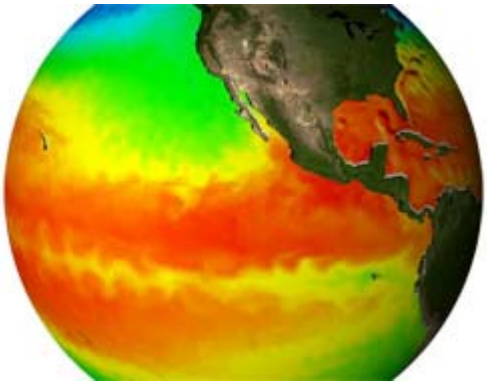

Image: *Sea surface temperature plays a vital role in the behavior of the Earth's climate and weather. It is both a causal factor and a resulting effect of complex interactions of natural forces on Earth. NASA not only measures sea surface temperature from space using powerful scientific instruments, but it also studies temperature processes in advanced computer models. Credit: NASA*

NASA is taking advantage of its unique space-based satellite observations of Earth's oceans and atmosphere, in combination with satellite observations and sea surface measurements from domestic and international partners, to learn more about why and how the world's waters are rising. In doing so, the agency is hoping to determine more about factors leading to sea level change, indicators of change such as ocean expansion, changes in ice, impoundment of water, and movement of Earth and coastal regions, and how the latest research developments contribute to our knowledge of sea level rise.

NASA is working with NOAA, the National Science Foundation, and others to explore and understand sea level change -- to tell the story of what is happening. NASA focuses on developing ways to look at sea level change using data from NASA satellites and aircraft instruments, as well as ground and air observations and ocean measurements from partners.

NASA satellite missions devoted to sea level research include: the Gravity Recovery And Climate Experiment (GRACE), which maps Earth's gravitational field with precision and resolution, and whose data helps us better understand movement of water throughout the Earth; the Ocean TOPography EXperiment (TOPEX/Poseidon), a joint U.S./French satellite that uses radar to map the precise features of the oceans' surface; Jason, which measures ocean height and monitors ocean circulation; and the Ice, Cloud and Land Elevation Satellite (ICESat), whose primary purpose is to study the mass of polar ice sheets and their contributions to global sea level change.

According to Dr. Laury Miller, Chief of the NOAA Laboratory for Satellite Altimetry in Washington, the big news that has emerged over the past few years is that the rate of 20th Century sea level rise is about two millimeters per year and that only a quarter of this is due to expansion caused by warming of the oceans. This provides an important context for these recent observations.

"We've found that the largest likely factor for sea level rise is changes in the amount of ice that covers Earth. Three-fourths of the planet's freshwater is stored in glaciers and ice sheets, or about 220 feet of sea level," said Dr. Eric Rignot, Principal Scientist for the Radar Science and Engineering Section at NASA's Jet Propulsion Laboratory in Pasadena, Calif. Research results by Rignot and partners, published in an October 2004 article in Science Magazine, further offer evidence that ice cover is shrinking much faster than thought, with over half of recent sea level rise due to the melting of ice from Greenland, West Antarctica's Amundsen Sea, and mountain glaciers.

The latest sea level research conducted by Dr. Steve Nerem, Associate Professor, Colorado Center for Astrodynamics Research at the University of Colorado in Boulder, and his colleagues, published in a 2004 issue of Marine Geodesy Journal, has found that recent TOPEX/Poseidon and Jason satellite observations show an average increase in global mean sea level of three millimeters a year from 1993-2005. This rate is more than 50 percent greater than the average rate of the last 50 years.

"Now the challenge is to develop an even deeper understanding of what is responsible for sea level rise and to monitor for possible future changes. That's where NASA's satellites come in with global coverage, and ability to examine the many factors involved," said Miller.