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The Indian Express **31 December 2015**

Indian Navy successfully test fires Barak-8 long range missile from INS Kolkata

In a boost to India's maritime prowess, the Navy today successfully test-fired the nearly 70 KM range Surface to Air Missile Barak 8 from INS Kolkata, paving the way for installation of the system, developed jointly by India and Israel, on board country's frontline warships. The Navy described the maiden firing of its newly developed Long Range Surface to Air Missile (LR SAM) as a significant milestone in enhancing its anti-air warfare capability. The firing was undertaken on the Western Seaboard by INS Kolkata, wherein the missile successfully intercepted an aerial target at extended ranges, a statement by Navy said. Two missiles were fired yesterday and today on high speed targets, during naval exercises being undertaken in the Arabian Sea. Apart from the missile, the system includes a Multi Functional Surveillance and Threat Alert Radar (MF STAR) for detection, tracking and guidance of the missile. The firing trial of the LR-SAM has been jointly carried out by the Indian Navy, DRDO and Israel Aerospace Industries. Israel made MF-STAR radar system is capable of simultaneously tracking hundreds of airborne targets to a range of more than 250 KM. DRDL, Hyderabad, a DRDO Lab, has jointly developed this missile in collaboration with Israel Aerospace Industries. The LR-SAM has been manufactured by M/s Bharat Dynamics Limited. These Surface-to-Air Missiles are fitted onboard the Kolkata Class Destroyers and would also be fitted on all future major warships of the Navy. The missile along with the MF STAR would provide these ships the capability to neutralise aerial threats at extended ranges. Barak-8 is designed to defend naval vessels against incoming missiles, planes and drones. With the successful proving of these systems, the Indian Navy has become part of a select group of Navies that have this niche capability, which would provide a fillip to India's maritime operations. The firing trial of the LR SAM has been jointly carried out by the Indian Navy, DRDO and Israel Aerospace Industries. It is expected that India and Israel are likely to win orders worth billions of dollars for the multi-purpose Barak-8 missile system. Designed to defend against a variety of short-to-long -range airborne threats, including fixed-wing ircraft, helicopters, drones and projectiles, Barak-8 incorporates phased array multi-mission radar, two-way data link, and a flexible command and control system, enabling users to simultaneously engage multiple targets day and night. A Barak-8 battery, including the Adir radar system made by IAI subsidiary Elta Systems, a command and control system, and the missile launchers, is already installed on the deck of Israeli Navy ship Lahav, from which the new interceptor was fired last week as part of a complete trial of the system.

The Times of India **31 December 2015**

Five-year national biotech strategy unveiled

Intending to establish India as a world class bio-manufacturing hub, the Centre on Wednesday unveiled the country's National Biotechnology Development Strategy 2015-2020 that would work to turn this sector into a $100 billion industry by 2025 with focus in areas of healthcare, food and nutrition, clean energy and education. Under this five-year strategy, the Centre will launch a major mission, backed with significant investments, for the creation of new biotech products, create a strong infrastructure for R&D and empower India's human resources scientifically and technologically. The strategy was unveiled by the Union minister of science and technology Harsh Vardhan who said his ministry had come out with it after consulting all stakeholders (scientists, academicians and industry). Under the strategy, research will be intensified in the field of vaccines, humane genome, infectious and chronic diseases, crop science, animal agriculture and aqua culture, food and nutrition, environmental management and technologies for clean energy. A major component of the programme will be training of the work force. It will include dual degree programmes which will cover both the aspect of core science and business applicability. It will also focus on enhancing research opportunities in basic, disciplinary and inter-disciplinary sciences and foster global and national alliances. "The exchange programme will also be thrown open for teachers at the under-graduate and post-graduate level. We are also opening 20 bio-connect centers in universities across the countries, which can help in interface between academia and industry," said Renu Swarup, a senior scientist and an advisor to the department of biotechnology. The DBT, under the five-year strategy, will create a technology development and translation network across India with global partnership.

US accuses Iran of conducting missile test near warships

Iranian naval vessels conducted rocket tests last week near U.S. warships and commercial traffic assing through the Strait of Hormuz, the American military said on Wednesday, causing new tension between the two nations after a landmark nuclear deal. The vital strait, a narrow waterway between Iran and Oman that is the route for nearly a third of all oil traded by sea, is crucial for ships taking part in the war against the Islamic State group in Iraq and Syria.While the United States has complained previously about other Iranian war games and manoeuvres there, Saturday's incident comes after a series of weapons tests and other moves by the Islamic Republic following the nuclear deal. Iranian media and officials did not immediately discuss the tests on Wednesday. Cmdr. Kyle Raines, a U.S. Central Command spokesman, said in a statement that Iranian Revolutionary Guard naval vessels fired "several unguided rockets" about 1,370 meters (1,500 yards) from the USS Harry S. Truman aircraft carrier, the USS Bulkeley destroyer and a French frigate, the FS Provence. Mr. Raines said commercial sea traffic also was nearby. He said the Iranian vessels announced over maritime radio that they'd carry out a live fire exercise only 23 minutes beforehand. The test comes after Iran and world powers led by the U.S. agreed to a landmark nuclear deal to limit the Islamic Republic's enrichment of uranium in exchange for lifting economic sanctions. While heralded by moderates in Iran, hard-liners have criticised the deal. In the time since, Iran has conducted missile tests criticised by the U.S., as well as aired footage on state television of an underground missile base.

Guidelines for civilian use of drones on anvil

There are "serious issues" with drone operations and the government is in the process of drafting guidelines for its civilian use. As part of this process, Ministries of Civil Aviation and Home Affairs are expected to hold a meeting mid-January, Civil Aviation Secretary RN Choubey said today. As of now, the Aircraft Rules do not cover use of drones as well as their sale and purchase. Aviation regulator Directorate General of Civil Aviation (DGCA) had in October last year restricted use of drones/unmanned aircraft system by civilians. "We are creating a Civil Aviation Requirement (CAR), which will indicate registration and tracking of drone," Choubey told reporters on the sidelines of an event here today. DGCA and Ministry of Home Affairs are working on preparing guidelines for civilian use of drones without compromising security, he said. The aviation regulator, while issuing a public notice, had said that its use, besides being a safety issue, also posed security threat. An unmanned aerial vehicle was sighted over the Indira Gandhi International Airport in October, prompting the Delhi Police to file an FIR. In the recent past, intelligence agencies have issued warnings that terrorists groups could use UAVs to stage a terror attack. The risk increases on important occasions like January 26 and August 15. Minister of State for Civil Aviation Mahesh Sharma had in March this year said the DGCA was working on formulating interim operational guidelines for the civil use of Unmanned Aerial Vehicles
The hindu 30 dec, 2015

The Indian Express **31 December 2015**

Indo-Israel Barak 8 Missile Testfired From INS Kolkata

NEW DELHI: In a boost to India's maritime prowess, the Navy on Wednesday successfully test-fired 70 km-range Surface-to-Air Missile Barak 8 from INS Kolkata, paving the way for installation of the system, developed jointly by India and Israel, on board country's frontline warships. With this test, India has joined a select group of countries which has such an anti-air warfare capability for their navies. According to Navy, this was a quantum jump for the country's air defence prowess. The Barak 8 missile fired by the Indian Navy from its warship INS Kolkata on the Western Seaboard successfully intercepted an aerial target at extended ranges. The missile has a range of nearly 70 km. The successful firing of the newly developed Long Range Surface-to-Air Missile (LR SAM) that was described by the Navy as a "significant milestone" in enhancing its anti-air warfare capability paves the way for installation of the system on India's frontline warships. Only a small club of countries including the US, France, Britain and Israel possess such a capability. Two missiles were fired on Tuesday and Wednesday on high speed targets, during naval exercises being undertaken in the Arabian Sea. Apart from the missile, the system includes a Multi Functional Surveillance and Threat Alert Radar (MF STAR) for detection, tracking and guidance of the missile. The firing trial of the LR-SAM has been jointly carried out by the Indian Navy, DRDO and Israel Aerospace Industries.

Business Standard **31 December 2015**

Indian Navy successfully tests long-delayed air defence missile

In a giant capability boost for the Indian Navy, a naval warship on Wednesday test-fired a new missile that can shoot down incoming aerial threats - aircraft and missiles - whilst they are still 70 kilometres away. A defence ministry press release stated: "Adding a quantum jump in its air defence capability, INS Kolkata, Indian Navy's state of art, indigenous stealth destroyer, successfully test fired the Long Range Surface to Air Missile (LR-SAM). Two missiles were fired on December 29 and 30 of on high-speed targets, during naval exercises being undertaken in the Arabian Sea." Israel Aerospace Industries (IAI) and India's Defence R&D Organisation (DRDO) have jointly developed the LR-SAM. The Israelis call this cutting-edge missile system the Barak-8, while India calls it the LR-SAM. In earlier days, ship-to-ship battles were fought with heavy-calibre guns, requiring warships to come within gun range of each other. Once a shell was fired from a gun, there was no way of intercepting it in mid-flight. Guns have now been replaced by long-range, anti-ship missiles, which are fired from submarines, ships or aircraft up to 150 kilometres away. Many of these, such as the US-made Harpoon II, are extremely accurate, with sensors on the missile guiding it unerringly onto its target. Anti-ship missiles have a key vulnerability, though. Since they are much bigger and travel slower that a gun shell, missiles can be detected at long ranges with radar, and then shot down in mid-flight with another missile. The LR-SAM is said to be capable of shooting down incoming missiles and aircraft with a reliability that exceeds 95 per cent. DRDO sources say there will be further tests to verify that accuracy and that the missile has been integrated properly onto INS Kolkata. The LR-SAM includes cutting-edge radar called the MF-STAR (multi-function surveillance, tracking and acquisition radar), which tracks incoming hostile aircraft and missiles at ranges out to 200 kilometres. It then guides an interceptor missile, fired from the warship, to shoot down the threat at ranges out to 70 kilometres.During the Kargil conflict of 1999, when war clouds were looming, the navy realised to its dismay that its warships had no counter to the Pakistan Navy's Harpoon anti-ship missiles.

SMEAR CAMPAIGN AGAINST N-INDIA

It is unfortunate that ace journalists like Adrian Levy and R Jeffrey Smith had to struggle with facts while talking about India's nuclear security. The authors must know that while criticising nuclear India, they are doing more harm than good to the cause of nuclear security The fourth and presumably final Nuclear Security Summit is going to take place in the US from March 31 to April 1, 2016. Expectedly, writings and views are being articulated to shape the agenda of the summit, much like it had been done in previous years. In 2014, for example, Washington, DC-based think-tank Nuclear Threat Initiative published its Nuclear Materials Security Index. This was the second edition of the controversial index and it was ignored, by and large, by national Governments because of its flawed methodology. This year, it seems, the Washington, DC-based nonprofit digital news organisation, Center for Public Integrity, has taken the lead and been publishing articles on the subject. In mid-December, the organisation published a series of four articles on different aspects of nuclear India, authored by noted journalist Adrian Levy. One of the articles talks about India's nuclear security. This article, 'India's nuclear explosive materials are vulnerable to theft, US officials and experts say' is co-authored by The Washington Post reporter R Jeffrey Smith. Unfortunately, even reputed writers such as Mr Levy and Mr Smith have struggled with facts in the article. Like other articles in the series, this one too has an agenda and, thus, a thesis that there is nothing good with nuclear India. The agenda seems to be that India should listen to what the Americans are saying directly or through foreign-funded non-government organisations. The facts and reports used to thrash nuclear India are old, and have been systematically and scientifically countered. Besides, the authors have exaggerated some incidents to prove that all is wrong with the Indian system. For example, one stray shooting incident that involved a Central Industrial Security Force personnel made the authors conclude that the entire CISF is not capable of handling the physical security of nuclear installations. The authors should know that there are organisations and groups other than the CISF that manage the security of Indian nuclear installations even though it is true that the CISF provides physical protection to different layers of the many key nuclear installations. The article quotes that CISF personnel are imparted special training before deployment. It needs to be added that the deployment of CISF to different layers or stages is done on the basis of threat perception. The Indian nuclear establishment and regulatory bodies like the Atomic Energy Regulatory Board have rules, codes, guidelines and manuals for physical protection of nuclear installations. These documents are regularly updated. The guiding documents take into consideration best practices in the world. The personnel providing physical security also receive training in foreign countries under international cooperation. Many security personnel have been trained in the US. Besides, CISF officials in charge of physical protection maintain that India not only takes into account best practices from around the world, but also evolves and innovates its own mechanisms. Quite possibly, some of the redundant and outdated practices are discarded. Even such a change takes place after proper deliberations. Likewise, the CISF is expected to buy the weapon required for physical or other protection, not the costly toys (weapons) sold by foreign countries. Similarly, the authors give an account of an American official who was checked quickly but not thoroughly at one of the nuclear sites in India. This sounds ridiculous. There could be two possibilities. First, the Indian system is efficient. Second, Indian agencies may have completed all the necessary checks on the concerned official. Foreign visitors come occasionally to nuclear sites and the entire system knows about them. What may have happened is that only required checks would have been performed on the American official who was, in any way, sent by the US Government to visit the Bhabha Atomic Research Center. Do the authors expect the Indian officials to behave as foolishly as the American security officials generally do at their immigration counters or elsewhere? The authors also record the 'surprise' of US and Indian officials regarding poor security of transportation of nuclear materials. This entire argument is based on ignorance. The Atomic Energy Regulatory Board has made public, the detailed guidelines for transportation of nuclear materials. The route of transportation is

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SMEAR CAMPAIGN AGAINST N-INDIA

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confidential, so is the identity of the vehicle. It is to go under protection. Depending on the route, the security forces of the concerned State Government(s) are contacted. The security agency responsible for transportation may modify the planned route, but it has to coordinate with relevant security agencies.
The article also provides "a series of documented nuclear security lapses". These documented lapses are wide-ranging from theft of uranium to poisoning of water. On all of these so-called lapses, the AERB and the Department of Atomic Energy have already filed their replies. Most of the listed lapses turned out to be hoax calls.
The police and journalists reporting the incidents did not have instrument to judge whether the material claimed as uranium was really uranium and of what type. Only after examination of the competent authorities, materials were properly recognised. The authors either did not take the trouble to cross check the claims or were committed to establishing something without taking all the factors into account.
For years, particularly after the 2010 Nuclear Security Summit, Western countries have been pushing for one particular centre. India is also setting up its own centre of excellence: In 2010, in Washington, the then Prime Minister announced the Global Centre for Nuclear Energy Partnership to perform the same task for which the Western countries were pushing that particular organisation.
Some Western Governments and non-profits tried to demean the Indian centre and kept promoting that particular organisation. The Center for Public Integrity, in its article, did the same thing: It created curiosity for persons like us and anxiety in the Indian nuclear establishment.
Actually, this is nothing but an intimidatory tactic to procure more information on the Indian nuclear programme in general and its weapons programme in particular. Some Western Governments have been both discreet and blunt about it. The authors and Western Governments need to know that their approach is doing more harm than good to the cause of nuclear security in the long-run.

Cabint okay N-deal with Australia

By siman sodhi

The Union Cabinet today ratified the civil nuclear co-operation agreement that India reached with Australia last month. India now has nuclear energy agreements with 11 countries. Some of these deals were inked this year and some were nudged forward like the much-stalled Indo-US nuclear deal. Prime Minister Narendra Modi, on his various foreign trips, pushed forward India's case for being the perfect candidate for signing such deals with other countries. India's track record in non-proliferation is spotless so far and India has always pointed to that to support its case. India will become the first country that has not signed the nuclear non-proliferation treaty to get uranium from Australia. "The civil nuclear cooperation agreement with Australia was brought into force on November 13 along with the administrative arrangement for implementing the agreement," a Cabinet communiqué said after the meeting that was chaired by the PM. The beginning of the year saw the PM and US President Barack Obama finally reach an understanding on the implementation of the Indo-US nuclear deal. Now, with the administrative arrangement in place and the India Nuclear Insurance Pool set up to implement the understanding on the liability clause, one expects to see

Business Standard **31 December 2015**

Life science developments to look out for in 2016

By Kiran Mazumdar Shaw

These are exciting times for the life sciences sector as it builds on its understanding of the disease at the cellular and genetic level to usher in new and differentiated therapies into the market. Furthermore, biomedical advances are likely to transform global health with early diagnosis and therapeutic intervention for chronic and killer diseases like autoimmune diseases and cancer. The top five scientific developments to be tracked in 2016 are: Immuno-oncology: It is one of the most promising fields of science being explored by scientists to develop pathbreaking solutions for unmet medical needs. The year 2015 saw some spectacular advances in this area, with a market opportunity of $40 billion by 2025, (source: Leerink Partners). PD-1 (programmed death-1) and PDL-1 (programmed death ligand-1) targeting antibodies andChimeric antigen receptor T-cells (CART), have demonstrated how technology can be leveraged for developing path-breaking therapies in immuno-oncology. The US Food and Drug Administration (USFDA) recently approved a drug that relies on a genetically-engineered version of the herpes virus to kill cancercells and stimulate immune response against malignant tumours in skin cancer patients. Several other immune-stimulating viral therapies are also being evaluated, for example, a genetically-modified polio virus to fight brain cancer and a re-engineered common cold virus for treating a form of bladder cancer. 3D bioprinting & stem cell therapy: Stem cell therapy is providing new hope in not only curing a number of debilitating diseases but also building organs under laboratory conditions for patients. Scientists believe that stem cell therapy is key to managing cancer, heart diseases, diabetes, Parkinson's disease etc in the near future. Recently, Therapeutic Goods Administration, Australia gave its first go-ahead to human studies for a revolutionary stem cell therapy aimed at halting/reversing the progression of Parkinson's disease, which affects up to 10 million people worldwide. Scientists in Australia have also achieved a medical breakthrough of getting stem cells to form different cell types found in the kidney.More significantly, a Bengaluru-based tissue engineering start-up has made India's first artificial human liver tissue with the help of 3D printing technology, using 10 million liver cells. This is a milestone that showcases the tremendous potential of 3D printing technology in organ development. It has the potential to save many lives. Biomarkers & companion diagnostics: Today, biomarkers are providing a wealth of biological data, which are helping predict drug failures before expensive clinical trials as well as allowing scientists to identify patient pools that would respond favourably to a particular drug. We already have cancer drugs for patients with specific genetic mutations. It has also led to the emergence of companion diagnostics, which screen patients for biomarkers that gauge the safety and efficacy of a particular treatment. Recently, the USFDA approved the first companion diagnostic to detect a protein associated with non-small cell lung cancer while approving Merck's Keytruda drug for the disease. The companion diagnostic will enable doctors to determine whether patients have high enough levels of the PD-L1 biomarker for Keytruda to be effective. Now, more sophisticated companion diagnostics are being developed to assess a patient for multiple biomarkers related to multiple drugs. Genomic sequencing: Genomics has created a new breed of life scientists and researchers, who look at disease in a very different way. A number of initiatives like the US-based medical geneticist Robert Green's MedSeq project, are looking at ways in which the profusion of genomics data and other clinical information can be integrated with day-to-day medical practice in order to assist the medical fraternity in determining a specific line of treatment for their patients. Already, genomic sequencing is being combined with molecular diagnostics, imaging and data analytics to decipher the cellular structure of malignant tumours and tailoring treatment regimens. Biosimilars: The development of biosimilars will provide affordable access to complex biologics in 2016. The first-ever USFDA approval for a biosimilar was granted to Filgrastim in 2015. Encouraging developments in highly regu-

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Life science developments to look out for in 2016

lated markets point to the evolution of abbreviated clinical pathways that will allow speedier entry of biosimilars. With $48 billion worth of patents on a number of blockbuster biologics slated to expire soon, the global biosimilars market is poised for rapid growth. India is well poised to play a significant role in the biosimilars area where companies like Biocon, Dr Reddy's, Intas, Zydus Cadila and others are engaged in developing high quality biosimilars to provide affordable access to these complex biologics. Indian patients have had access to some of the biosimilars like Insulins, Analogs, Filgrastim etc. since early 2000s and more recently complex antibodies like Trastuzumab, Rituximab, Adalimumab etc. have also been introduced. This early experience with developing biosimilars will pave the way for Indian players to capitalise on this unfolding global opportunity. We are living in extraordinary times, where technology is revolutionising life sciences. Cancer is no longer a death sentence but a manageable chronic disease. We are witnessing the development of innovative therapies that are addressing the unmet patient needs for life-enhancing therapies. Clearly, it is time to look out for a new paradigm in global health care where the blind can see, the deaf can hear and the paralysed can walk.

The Tribune **31 December 2015**

Navy test-fires Barak missile

Inching towards having greater potency at sea, Indian Navy warship INS Kolkata successfully test-fired long-range surface-to-air missile (LRSAM) Barak NG against a remotely piloted flying target over the Arabian Sea this morning. Indian Navy spokesperson Captain DK Sharma said: "The missile successfully intercepted an aerial target at extended ranges." The Indian Navy has become part of a select group of navies that have this niche capability, which will provide a fillip to Indian maritime operations, Captain Sharma added. The Defence Research and Development Organisation (DRDO) and the Israel Aerospace Industries (IAI), Israel have developed the LRSAM in collaboration with the Navy. In November, the LRSAM was tested from an Israeli warship. The test was to launch the missile from a moving warship and verify its ability to identify and kill the target mid-air while even changing course mid-flight. The Barak NG will be main stay on Navy warships and 20 of them will have it in the near future. Each ship will carry 32 such missiles. It has a range of 80 km and height ceiling of 16 km. The Multi-Functional Surveillance and Threat Alert Radar (MF STAR) that is integrated with the LRSAM has the ability to simultaneously engage 12 targets with 24 missiles. The MF STAR can pick up threats from as far as 400 km away, allowing the ship crew ample reaction time to prevent an oncoming threat - such as fighter jets, helicopters, enemy missiles, UAV's and planes. It is a generational shift over the in-use Barak 1 missile system, which has been fitted on a host of naval ships, including aircraft carrier INS Viraat. The new LRSAM guarantees protection to a ship from an aircraft or even a sea-skimming cruise missile. Very few missile systems offer protection to ships against aircraft and very few can do it to stop sea-skimming cruise missiles. A sea-skimming missile is difficult to detect. The LRSAM will be deployed on the sea borne aircraft carrier INS Vikramaditya and under-construction aircraft carrier INS Vikrant. It's easier to fit the LRSAM in under-construction ships, fitting it onto the existing platforms such as INS Vikramaditya will be a complex procedure and it will entail some cutting through the deck, a period of eight-nine months will be needed to do this.The DRDO was tasked with producing the propulsion rocket system, thrust vector system and certain other components. Israel Aerospace Industry (IAI) has built the seeker and the last stage avionics. The LRSAM is manufactured by Bharat Dynamics Limited, a public sector company owned by the Ministry of Defence. Apart from the missile, the system includes for detection, tracking and guidance of the missile and a weapon control system.

Deccan Herald **31 December 2015**

Fighting challenges, scientists prove their mettle

By kalyan ray

Overcoming technology denial, Indian space scientists tasted a rare success in 2015 when the geo-synchronous satellite launch vehicle (GSLV) with indigenous cryogenic engine carried a communication satellite to its desired orbit, 36,000 km above the earth. The GSLV success is a culmination of two decades of research after Russia buckled under US pressure and backtracked from an agreed contract of providing cryogenic technology - needed in intercontinental ballistic missile as well-to India. Moscow supplied only six cryogenic engines to India but not the technology. Cryogenic engines This compelled space scientists and engineers to undertake an ambitious research programme to develop the cryogenic engines at home. Five of the six Russian engines were used to launch five GSLV between 2001 and 2007, out of which two missions failed. Left with only one Russian engine, the Indian Space Research Organisation (Isro) badly wanted success on the indigenous cryo front. A more powerful version of the rocket called GSLV Mark-III is in the making for ferrying 4 tonnes class satellites to the orbit. Its first test was successful but there are still miles to go for this heavy-duty rocket. In its first flight, the rocket was used to test re-entry performance of an unmanned crew module, which would later be used by Isro for its manned flight. The module came out with flying colours. Isro was also successful in launching the first Indian space observatory, Astrosat, riding high on the success of Chandrayaan and Mars Orbiter Mission. Astrosat will observe Neutron stars, Black Hole, star birth regions beyond the Milky Way galaxy and bright X-ray sources, marking Isro's foray into space-based astronomy. Keen to emerge as a serious player in the global space launch market, Isro's workhorse PSLV launched as many as 17 foreign satellites from seven countries including one from the US. Nuclear sector Other clients are Canada, the UK, Indonesia and Singapore. The nuclear sector, on the other hand, had a rather low-key year and Kudankulam nuclear power plant remains shut for the last six months. The government finally managed to fill up top posts in scientific establishments, but attracted criticism for having a session at the Indian Science Congress, Mumbai on ancient Indian aviation and organising a science fest at the Indian Institute of Technology, Delhi, with the support of an RSS-backed outfit. Though there are barely any high-profile scientific discovery in Indian science laboratories, an index prepared by the UK-based journal Nature, suggests India's research output is growing steadily to figure among the world's top 15 countries in terms of research papers, chemistry being the strongest point of Indian scientists.

Transformed foreign policy

India's biggest success with foreign policy has been its unpredictability with interlocutors, generating a new sense of expectation. As the year 2015 comes to an end, the Narendra Modi government sprung another surprise with its outreach to Pakistan. The larger trajectory of Indian foreign policy remains robust with an effective team at the helm led by the prime minister himself. India today is projecting a much more robust profile on the global stage than it was managing to do over the previous decade despite all that was going for it. It is the new leadership which has made all the difference. India's biggest success in the realm of foreign policy and national security has been its ability to keep its interlocutors on tenterhooks. The unpredictability of a nation whose responses had become all too easy to predict over the last few decades is generating a new sense of expectation among its interlocutors. From Pakistan to the US, from Africa to the Asean, there is now an expectation that the new dispensation in New Delhi means business. The bedrock of a nation's strength in contemporary global politics remains its economic strength. By putting the Indian story back into reckoning after callous mismanagement by its predecessor, the Narendra Modi government has shored up India's rapidly dwindling credibility. The fact that it has been able to do it despite an obstructionist opposition is even more remarkable. For all the disruption of Parliament by the Congress, the image of a business-minded Modi government remains intact for the outside world. Another success of the Modi government has been a careful nurturing of major power relations and a deft management of an ever shifting global and regional balance of power in Asia and beyond. The US today is looking for its new leader. There is a political vacuum in Washington which is being exploited by the challengers such as China and Russia with their supposedly strong leaders. In this milieu, the Modi government has managed to carve out a robust relationship with the US even as it has stabilised ties with Beijing and Moscow. It is not going to be easy as Russia's growing closeness to China will have serious implications for India, but India has so far been successful in conveying its concerns to all three major powers with a degree of confidence which was absent in the past. India's engagement with Europe, too, is now more forward looking and devoid of the unnecessary rhetoric of perpetual inferiority. There is a clear message going out that India will act on its own terms and conditions and can skillfully play the role of a balancer. The Modi government's regional outreach has also made a difference in this regard. In its own vicinity in the Indo-Pacific, India is now perceived as a credible balancer at a time when China's maritime assertiveness has created space for Indian diplomacy. This was made possible by New Delhi's outreach to like-minded states in the region such as Japan, Australia, Vietnam, Singapore, Philippines and Malaysia. Gone is the diffidence of the past when India used to walk on eggshells for fear of offending China. The Modi government wants to enhance its footprint in Africa, Latin America and West Asia to underscore the distinct advantages that India possesses in comparison to China's more mercantilistic approach. The focus is now on delivery of the commitments that India has made to other regions, an aspect where India lags considerably behind China and other major powers. It is in South Asia that the Modi government has been facing some criticism over the last few months with turmoil in Indo-Nepal and Indo-Pakistan ties. But even in a region as mired in historical grievances as South Asia, India has managed to traverse considerable ground over the last year and a half. Boost in relations India's ties with Bangladesh today are the best they have been in the last two decades. India has done well by showing magnanimity in resolving its long-pending disputes with Dhaka. Relations with Sri Lanka are also on an upward trajectory under the Sirisena government. Afghanistan has also recognised the folly of ignoring Indian concerns and the two nations are now joining hands in exposing Pakistani military's machinations. India is now enhancing its security role in Kabul at the invitation of the Ghani government.

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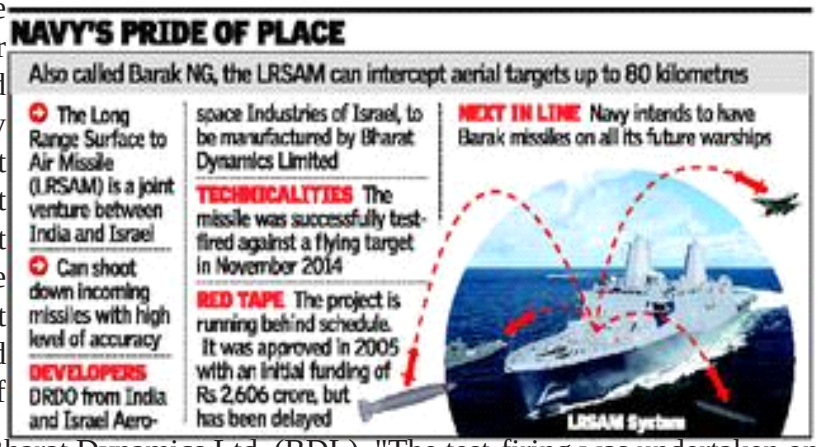
Transformed foreign policy

Nepal remains a problem, largely because the political elites in the country have not managed to reconcile internal differences. India remains an easy target to channel domestic grievances, but a perception has gained ground about Indian interference. There are signs that some sort of reconciliation is beginning to shape up and India can play a role in making that happen. But New Delhi should be wary of playing an overt role in Nepal and let the domestic constituencies resolve their constitutional agenda. The Modi government is ending the year on a high note with its dramatic outreach to Pakistan. After carefully working throughout the year to isolate Pakistani military globally as the epicentre of terror, New Delhi is now reaching out to the civilian government in Pakistan to ensure that those constituencies which want a long-term regional solution get strengthened. India today stands on the cusp of a major transformation and Indian leadership will have to remain relevant to these changing times. Eventually, the Modi government's success will be assessed at the end of its five-year term in 2019, but at the end of a year and a half, it is clear that this government is ready to discard old shibboleths and chart a new foreign policy trajectory.

Indo-Israel anti-aircraft missile test-fired

Dinakar Peri

One of India's most ambitious and costly efforts to develop a surface-to-air missile system, in collaboration with Israel, achieved a significant milestone over the last two days with its successful firings from an Indian naval warship. The long-range surface-to-air missile (LRSAM) - land version is medium-range SAM or MRSAM - is the product of a joint development project of India and Israel. It is said to be a very advanced SAM that can track and shoot down incoming missiles and other flying objects with high-level accuracy. While the LRSAM is for the Navy, the Air Force has an order for the MRSAM and the Army variant has been recently approved.Also called Barak NG (next generation), the LRSAM can intercept aerial targets up to a range of 80 km. It is being co-developed by the Defence Research and Development Organisation (DRDO) from India and the Israel Aerospace Industries (IAI) of Israel, and will be manufactured by Bharat Dynamics Ltd. (BDL). "The test-firing was undertaken on the western seaboard by INS Kolkata , wherein the missile successfully intercepted an aerial target at extended ranges," the Navy said in a statement on Wednesday. The system has a multifunctional surveillance and threat alert radar (MF STAR) for detection, tracking and guidance of the missile, a Navy statement said. The missile was successfully test-fired for the first time against a flying target from an Israeli warship in November 2014.It was approved in 2005 with an initial funding of Rs. 2,606 crore and was to be inducted in 2011, but has been delayed by technical difficulties.Centre counts on Big Data to grow biotech



jacob koshy

By harnessing the power of Big Data and promoting the manufacturing of laboratory equipment, the Department of Biotechnology expects biotechnology to be at the foundation of a $100-billion industry by 2025, rising from the current $7-$10 billion.

The Hindu **31 December 2015**

Centre counts on Big Data to grow biotech

jacob koshy

By harnessing the power of Big Data and promoting the manufacturing of laboratory equipment, the Department of Biotechnology expects biotechnology to be at the foundation of a $100-billion industry by 2025, rising from the current $7-$10 billion. The government expects this growth to be largely led by industry and it will play the role of facilitator, in terms of attracting quality manpower and putting in place competent regulatory processes, said top officials at the launch of the National iotechnology Development Strategy, 2015-20. "It does appear to be an ambitious task and projecting from current levels, it does seem far-fetched," said K. VijayRaghavan, Secretary of the department. "The vision we have in place, however, should help us achieve it." He emphasised that critical steps to achieve this would be to ensure that projects were adequately and promptly funded, besides getting biotechnologists and researchers to be more ambitious with their research proposals. Science Minister Harsh Vardhan added that Prime Minister Narendra Modi was eager about the potential of biotechnology in societal change. Two critical pieces of legislation championed by the DBT - the Biotechnology Regulatory Authority of India Bill and the Human DNA Forensic Bill - are yet to make it to Parliament. The BRAI Bill is hanging fire over doubts whether the body would be a disinterested arbitrator of genetically modified products and the DNA Bill over controversies it has caused about violating individual privacy. "These issues have mostly been resolved, and the BRAI Bill will be cleared by the Cabinet soon," Mr. Harsh Vardhan said. The NBDS, by 2020, expects to launch four missions in healthcare, food and nutrition, clean energy and education; create a technology development and translation network across India with global partnership, including five new clusters, 40 biotech incubators, 150 technical transfer organisations and 20 bio-connect centres. The NBDS is the result of consultations over the past two years with more than 300 stakeholders, including scientists, educators, policy-makers, industry, voluntary and non-governmental organisations, regulators and international experts.

The Economic Times **31 December 2015**

Human -like social robot invented

:Scientists have developed a human-like social robot with soft skin and flowing brunette hair, which is capable of autonomously expressing emotions and gestures like shaking hands and conversing. nadine is a friendly robot which smiles while greeting you, looks at you in the eye when talking, and will remember your name and your previous conversation the next time you meet her, researchers said. Scientists from the Nanyang Technological University (NTU) in Singapore have developed two social robots - Nadine and a tele-presence robot EDGAR that can be controlled remotely, allowing you to interact at a conference without physically being there. Nadine looks almost like a human being, with soft skin and flowing brunette hair. Unlike conventional robots, Nadine has her own personality, mood and emotions. She can be happy or sad, depending on the conversation. She also has a good memory, and can recognise the people she has met, and remembers what the person had said before. Nadine is powered by intelligent software similar to Apple's Siri or Microsoft's Cortana. The humanoid can be a personal assistant in offices and homes in future. She can be used as a social companion for the young and the elderly, the researchers said. Robotics technologies have advanced significantly over the past few decades and are already being used in manufacturing and logistics," said Nadia Thalmann, the director of the Institute for Media Innovation at NTU who led the development of Nadine. "As countries worldwide face challenges of an ageing population, social robots can be one solution to address the shrinking workforce, become personal companions for children and the elderly at home, and even serve as a platform for health-care services in future," said Thalmann. Nadine's robot-in-arms, EDGAR, is a tele-presence robot optimised to project the gestures of its human user, complete with a rear-projection screen for its face and two highly articulated arms. By standing in front of a specialised webcam, a user can control EDGAR remotely from anywhere in the world. The user's face and expressions will be displayed on the robot's face in real time, while the robot mimics the person's upper body movements. EDGAR can also deliver speeches by autonomously acting out a script. With an integrated webcam, he automatically tracks the people he meets to engage them in conversation, giving them informative and witty replies to their questions. Telepresence provides an additional dimension to mobility. The user may project his or her physical presence at one or more locations simultaneously, meaning that geography is no longer an obstacle," said Gerald Seet from NTU.

Has the world reached its multilateral moment?

STANLY JOHNY & SRINIVASAN RAMANI

If one is asked about a seminal achievement in international relations that the year 2015 will forever be remembered for, it would be the P5+1-Iran nuclear deal, which was a remarkable piece of diplomatic initiative and action. The deal, which paved the way for removal of economic sanctions against Iran in return for stringent monitoring and drawdown of its nuclear programme, allowed for new vistas in the West's relations with the West Asian power. In particular, if future administrations in both the U.S. and Iran live up to the agreement, the thaw in the relations brought about by it could transform geopolitical equations in West Asia. It could also possibly provide a way to dampen tensions in the region, which have persisted for more than three decades since the overthrow of the U.S.-friendly Shah. This in itself is possibly the biggest silver lining in an otherwise gloomy year that saw a massive refugee crisis, an unclear trade climate, a new tacit geopolitical contest between the two largest economies in the world (the U.S. and China). It is also a year that saw the rapid projection, even if not the actual rise, of a new rabid extremist force through the Islamic State. The Iran nuclear deal was a moment that followed protracted negotiations on a multilateral forum involving Iran and the six world powers - the U.S., China, Russia and three EU nations, Germany, the U.K. and France. The deal materialised despite domestic pitfalls, both in the U.S. and in Iran, of bringing about a successful agreement. The climate agreement in Paris in December 2015 did heap in an additional responsibility on the shoulders of the developing world. However, its emphasis on a multilateral arrangement in the mitigation of climate change gave it a consensual heft missing in the earlier summits. Besides, the year also saw the Barack Obama administration's gradual retreat from the unilateralism and the military adventurism of Mr. Obama's predecessor. The focus of the administration has shifted from direct interventions to offshore balancing, as the conflicts in Syria and Iraq would testify. The question that naturally arises is: has the world finally reached a "multilateral moment"? The Iran nuclear deal and, to a great extent, the climate deal signed in Paris late in December are certainly symbolic of a burgeoning phase of multilateralism. This was characterised by the U.S. not acting as a singular fulcrum of power, but as one among a set of actors, sometimes in concert and sometimes in dissonance. The rise of the Right That said, though there are cracks in the post-Cold War order, it's still not clear whether it will evolve into a balanced multipolar world. The recent changes in the global economic architecture and power politics have not only challenged the U.S.-centric world, but have also unleashed forces of instability which could slow down, if not prevent, the emergence of a new system. For example, if the global financial crisis challenged the Western dominance in the global order, it also triggered enormous social and political tensions, especially in the domestic arena of the countries in the developed world. The rise of the Right in Europe as well as in the U.S. is a clear manifestation of these tensions. On the one hand, the Western project failed to mainstream cultural dissent. On the other, economic crises, growing unemployment and the real and perceived threat of Islamist terrorism have emboldened a far-Right narrative of state and society in a number of Western nations. In Victor Orban, Hungary already has a Prime Minister who calls for protecting Europe's "Christian values" against the influx of migrants. In France, the far-right Front National of Marine Le Pen was defeated in December's regional elections only through a tactical voting. In the U.S., the rise of Donald Trump as a leading Republican presidential candidate who wants to ban the entry of Muslims is alarming. Despite running a highly polarised primary campaign, Mr. Trump is still the most popular candidate among the Republican hopefuls. If the New Right captures power in any of the major countries, say France or the U.S., its consequences for the international system could be monumental. Antagonistic bipolarity Another potential challenge to cooperative multilateralism is an antagonistic bipolarity at a regional level. There are plenty of two-tier crises in modern world such as those involving India and Pakistan; China and Japan; and Russia and Ukraine. Containing them is vital

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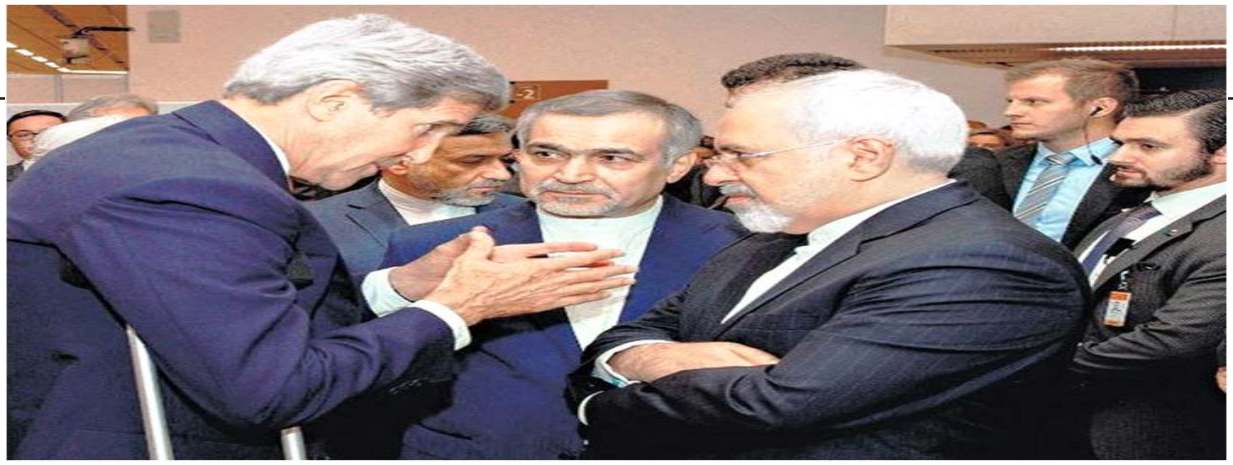
Has the world reached its multilateral moment?

part-2

for the interests of the larger world. But the year 2015 saw a dangerous addition to this list-hostility between Russia and Turkey. Basically a by-product of the Syrian crisis, the Russia-Turkey antagonism has the potential to plunge the whole world into a dangerous military conflict. Russia has shown commendable restraint after its warplane was shot down by Turkey over the Syrian border in November. Barring occasional rhetoric and some economic sanctions, Moscow has not done anything to disrupt the status quo. But it might not remain stoic if there are more provocations. And since both Russia and Turkey are deeply involved in the Syrian conflict, tensions between these two countries would remain unless a sustainable solution is found to the Syrian crisis, which is the challenge of 2016. Thirdly, the U.S.'s retreat from unilateralism is not out of choice, but, to a certain extent, out of compulsion, and it doesn't mean that Washington has given up on dominating global politics. In ideological terms, President Obama has effected a shift in the U.S. foreign policy, from the neo-conservatism of his predecessor to a more liberal version of realism. There is still the possibility of the powers-at-large in the U.S. reverting to a more aggressive foreign policy thinking if the "multilateral emphasis" does not yield dividends for its core interests. Year 2015 showed that other powers rose, but not at the expense of the U.S. However, whether this trend will continue is a question. Clearly, the outcome of any move to hegemonise the conduct of international affairs again by the U.S. would be disastrous. However, the structural challenges to unilateralism show that the U.S., despite being the world's preeminent military and economic power, cannot lead the world through dominance. Now that its economic power has been curtailed by the ongoing crisis in the capitalist order and its military strength is being challenged in asymmetric warfare in several places such as Afghanistan and Iraq, Washington's ability to unilaterally shape global politics stands at the lowest point since the end of the Cold War. Yet, as the Iran deal points out, a multilateral emphasis is good for the world.The year 2015 has underscored the trend of strengthening multipolarity but has also bolstered the forces of instability. Which of these factors emerge stronger would shape the future global order.



The thaw in U.S.-Iran relations resulting from the nuclear deal could transform geopolitical equations in West Asia." Picture shows U.S. Secretary of State John Kerry (left) speaks to Iranian Foreign Minister Javad Zarif in Vienna on July 14, following the historic agreement.

Can SunEdison pull off its India plans?

T E Narasimhan

Renewable energy major SunEdision took everybody by surprise when it bid a record low tariff of Rs 4.63 per kWh for NTPC's solar power project in Andhra Pradesh. And the company again created a stir when it called off its agreement to acquire Continuum Wind. Pashupathy Gopalan, who heads SunEdison's Asia-Pacific operations, says India is a key market and the company will invest $2 billion in India over the next three years. The government has set a 175 GW renewable energy target by 2022 and India will need $100 billion investment to generate 100 GW of solar energy. "We have had a phenomenal journey in India so far, emerging as one of the largest renewable energy developers in the country. We will continue to contribute to India's renewable energy story in a meaningful way," says Gopalan. SunEdison has since 2009 built 350 MW of solar energy plants and has a pipeline of solar and wind power plants that will generate 2 GW in the next 18 months. In November, SunEdison won a 500 MW NTPC project in Kurnool district in Andhra Pradesh, bidding Rs 4.63 per kWh, less than Japan-based SoftBank Group's bid of Rs 4.80. The project will be commissioned by early 2017. Many have questioned the viability of the project, saying it will be difficult for SunEdison to raise finance at the quoted tariff. However, Gopalan says solar panels that contribute 70 per cent to the cost of solar plants have come down from $3-3.5 per watt in 2008 to 52 to 55 cents in 2015 and are falling even now. "The other bidders were not too far away in their final prices, which shows solar power is now at grid parity," he adds. The cost of capital for the project could be half a percentage point lower because NTPC will be evacuating power from the plant, points out Gopalan. With the government providing land and assured evacuation of power, the project is different from past solar tenders in India in many ways, and SunEdison is confident of making healthy returns.SunEdision has a target of setting up 2 GW of solar and wind power plants in India over the next 18 months, which will need an investment of $2 billion. Of this, the company intends to borrow $1.4 billion. SunEdison plans to sell cash-yielding assets to TerraForm Global, which raised $675 million during its initial public offering in August, when SunEdison also said it would issue $800 million in green bonds. TerraForm Global, focused on emerging markets, says it will own 1.4 GW capacity by the year-end, almost 60 per cent of it wind power. Also in August, a $1 billion clean-power fund through Goldman Sachs and a number of banks was announced for SunEdison. So far, SunEdison has developed and sold projects worth $3 billion globally, in a warehouse approach to raising capital. Typically, SunEdison sells 10 per cent of its international portfolio on average. Some of the major investors include Goldman Sachs, JPMorgan and First Reserve. It is trying to adopt this concept for India. The company plans to use a portion of the $231 million it expects to raise by selling a series of projects in India to TerraForm Global to pay down its margin loan. "We are looking at strategic alternatives to bring equity to build our projects in India. We are very early in the process and have received a good response so far," says Gopalan. Renewable energy projects provide secure and reliable cash flows for 30 years and can be of interest to pension funds and insurance companies. "As investors become comfortable with renewables, this type of platform can become successful in India and will bring down the cost of capital," Gopalan adds. On terminating its agreement with Continuum Wind, Gopalan says SunEdison wanted to safeguard liquidity and preserve cash. This is in line with SunEdison's decision to align its business operations globally with market opportunities.