

# समाचार पत्रों से चयित अंश Newspapers Clippings

दैनिक सामयिक अभिज्ञता सेवा

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## **Ashok Leyland sets its sights high in defence**

*It wants to grow 10-fold in five years through strategic alliances*

Last month, Ashok Leyland Defence Systems, a division of Hinduja group's flagship, Ashok Leyland, roped in US-based defence contractor Lockheed Martin to develop combat vehicles for the Indian Army.

The technology sourcing agreement with Lockheed is the latest in a string of partnership deals from Ashok Leyland to step up its defence play and to reach a turnover of Rs 5,000 crore over the next five years.

This, by any stretch of imagination, is an ambitious target, given that its current revenue is a little over Rs 600 crore. However, it may not be entirely unachievable. Since its inception in 1998, Ashok Leyland's defence arm has relied heavily on strategic alliances to win big contracts. Over the past decade, it has signed three deals with overseas players to boost its technological know-how. It is now looking to do the same with Lockheed.

Nitin Seth, president (light commercial vehicle & defence), Ashok Leyland, says the right technological support is critical to the success of a company trying to make a mark in defence manufacturing, given the huge initial costs involved in developing products.

"It is not that we cannot develop our own technology, but considering the time it takes and the money that is required (Rs 400-Rs 500 crore), it is better to source (platforms) which are in service," says Seth.

The latest deal, for instance, will allow Ashok Leyland to use Lockheed's platforms for its light-specialist vehicles (LSV) and light-armoured multipurpose (LAM) vehicles. In addition to giving it a foothold in the \$1-billion armoured vehicle market in India, the tie-up will significantly boost its overall capabilities in providing mobility solutions for the army.

Defence mobility is one area Ashok Leyland is betting on heavily. Already, it is the largest supplier of medium- and-heavy vehicles to the army. Its warhorse, the Stallion, was used to carry troops to the battlefield during the Kargil war, and from 400 Stallions in 1998, the army today has over 70,000 Stallions, accounting for almost 80 per cent of its fleet of big vehicles.

Backed by Lockheed's technological support, Ashok Leyland is looking to bid for LSV and LAM vehicle programmes of the Indian Army. It believes the tie up will significantly shrink the time taken to develop the vehicle and also help it keep the costs low, as it won't have to start manufacturing from scratch.

### **A shot in the arm**

If Ashok Leyland becomes a supplier of LSV and LAM vehicles, its revenue could straightaway get a boost of Rs 5,000 crore. Then, there is also the scope for recurring demand as the army doesn't change its models frequently. This means the business from these programmes could be four or five times bigger than what is believed today.

Ashok Leyland, however, is not banking on armoured vehicles alone to reach the Rs 5,000 crore target. It has also joined hands with Sweden's defence and security company Saab and is looking for an alliance with Bharat Forge to produce vehicles to carry guns and missiles. The idea, the company says, is to have a wide range of products under one roof to meet all requirements of the army.

So far this strategy has proved fruitful. Out of the 14 tenders to supply medium and heavy trucks floated over the past year, Ashok Leyland claims to be in the final stages (L1 stage) of at least 12 of these. However, it has not disclosed the deal value yet.

This means Ashok Leyland is proving to be cost-competitive in India. One way, it has achieved this is by localising production as much as possible. "In order to have a viable business in defence, one should have at least over 80 per cent localisation but for certain products we have achieved almost 100 per cent localisation," says Seth.

Its strengths are clearly reflected in its order book. It recently bagged a Rs 800-crore tender to supply 450 artillery tractors and Stallions and 825 ambulances to the army.

Yet, its future is not without challenges. Other major players, including Tata Advanced Systems, Mahindra Defence Systems and Bharat Forge, are also keen on the LSV and LAM programmes, increasing competition in the space. This is the first time the Indian army has called for bids for these vehicles (1,300 LSV and 700 LAMs). Equipped with sophisticated technology, including thermal imaging and mounted machine guns, these vehicles are highly effective in combing and patrolling operations, be it within the city or along the border.

While the vehicle is popular worldwide, especially with the armies in the US, the UK and Iraq, it cannot be imported because the specifications for speed, power and weight differ based on local conditions.

Seth says while Ashok Leyland has a head-start with the platform provided by Lockheed, it will still have to make heavy investments in redesigning the product to acclimatise it to Indian conditions. Currently, the prototype of the vehicle, along with that of two other companies, is in the testing stage with the army. If Ashok Leyland wins the commercial bid, it will be in a position to start manufacturing by 2019.

However, because it takes a long time for defence contracts to materialise and the outcome even after the gestation period is unpredictable, the company is also looking at exports to safeguard its interests.

*The Hindustan Times*  
08 Apr, 2016

## **India, US to conclude talks on vital defence agreements**

*US Defence Secretary Carter Arrives In Goa on April 10 and Will Visit Navy Base Ins Kadamba With Parrikar The Next Day*

NEW DELHI: India and the United States will conclude talks on three vital defence pacts during the three-day visit of Defence Secretary Ashton Carter beginning in Goa from Sunday.

The three agreements are the Logistics Support Agreement (LSA) on military cooperation, Communication Inter-operability and Security Memorandum of Agreement (CIS MO A) on transfer of technology, and the Basic Exchange and Cooperation Agreement on sharing mapping data and imagery. The three deals are to be formally signed later.

US Defence Secretary Carter arrives in Goa on April 10 and will visit navy base INS Kadamba at Karwar with defence minister Manohar Parrikar the next day.

Carter will take a tour of India's biggest aircraft carrier INS Vikramaditya. In turn, Parrikar will accompany Carter to the US Pacific Fleet's command vessel, the USS Blue Ridge, at Mormugao harbour. The 45-year-old vessel is the oldest ship in the US Seventh Fleet and remains its command and control post.

Carter will arrive in Delhi for talks with Prime Minister Narendra Modi and his senior colleagues only on April 12.

Top sources told Hindustan Times that the primarily naval LSA agreement will allow Indian and US ships to pick up fuel and supplies from each other's bases for humanitarian purposes, disaster relief, coordinated exercises, antipiracy patrols as well as for protecting sea lanes. Special permission will, however, have to be sought by both US and India in case their ships are on wartime missions.

India is also expected to okay the CISMOA document as it will help the US transfer high-end technology, particularly on aircraft carriers. India plans to build its third air defence ship (ADS) in collaboration with the US; a bilateral joint working group has already been created.

Discussions on these three agreements are expected to feature in the joint statement after Carter concludes his India visit.

### **Parrikar in China**

Defence minister Parrikar is expected to travel to Beijing, China, on April 17-18. He will call on Chinese President Xi Jinping as well as his counterpart, Chang Wanquan.

Barring some incursions south of the Depsang Plains in eastern Ladakh, Chinese intrusions across the 3,488-km Line of Actual Control have gone down.

China has been proactive in extending its reach in the South China Sea.

*पंजाब केसरी*  
*08 अप्रैल, 2016*

## **पूर्व सेना प्रमुख जे.जे. सिंह को फ्रांस का सर्वोच्च नागरिक सम्मान**

नई दिल्ली, (भाषा): पूर्व सेना प्रमुख जनरल (सेवानिवृत्त) जे.जे. सिंह को अगले सप्ताह फ्रांस के सर्वोच्च नागरिक सम्मान आफिसर आफ द लिजियन आफ आनर से सम्मानित किया जाएगा। फ्रांसीसी दूतावास ने यहां बताया कि सिंह को भारतीय सेना के आधुनिकीकरण में उनकी शानदार भूमिका और भारत और फ्रांस की सेना के बीच अप्रत्याशित स्तर का सहयोग और अंतर संचालनात्मकता, शाश्वत संबंध तैयार करने और दोनों देशों के बीच पारस्परिक समझ को प्रोत्साहन देने के उद्देश्य से आदान-प्रदान शुरू करने पर इस पुरस्कार के लिए चुना गया है। आफिसर डि आर्डर नेशनल डि ला लिजियन डी आनर देश का सर्वोच्च असैनिक सम्मान है और फ्रांस के लिए असाधारण सेवा करने वाले को फ्रांसीसी गणराज्य द्वारा दिया जाता है।

## **Adani Defence Biz Ally has JV with Panama-Hit Italian Company**

By Manu Pubby

### ***Alpha, partner of Elettronica, to make military drones with Adani Aero Defence***

Alpha Design Technologies, an Indian defence electronics firm which recently tied up with Adani Aero Defence Systems, part of the Gautam Adani-led group, is also the main Indian partner of Elettronica, the Italian defence company whose name has surfaced in the 'Panama Papers' for allegedly paying commissions in India.

The Alpha Design-Adani Aero Defence agreement is to produce military drones in partnership with Israeli firm Elbit. The agreement was announced on March 30.

Alpha Design's Chairman Col HS Shankar told ET his company is in partnership with Adani Aero Defence. On Alpha's partnership with Elettronica, Shankar said the venture was "set up for a project that's yet to take shape". The Adani Group did not respond to questions from ET. Elettronica has denied any wrongdoing after the Panama Papers surfaced.

Elettronica's name surfaced earlier this week after global media coverage of information on offshore accounts in Panama. Reports suggested that the Italian defence company had agreements to pay 5-17% commissions for Indian defence contracts. Elettronica has denied any wrongdoing.

The Italian firm has a 20% stake in an Indian JV -Alpha Elettronica Defence Systems Pvt Ltd -with Alpha Design. The Bengaluru-based JV started in 2007. In its latest annual report, dated September 2015, the company says a project to develop a "self-protection jammer system" was in the "final stages of testing and integration on the main platform".

The Panama Papers refer to a marketing pact between Elettronica and an offshore firm Intertrade Projects, and it mentions self-protection jammers for the IAF's Sukhoi 30MKI aircraft.

*The Asian Age*  
08 Apr, 2016

## **Pakistan: Ready to talk arms control with India**

Pakistan on Thursday said it is ready to discuss arms control and restraint measures with India to avoid unnecessary arms race in the region, days after US President Barack Obama asked both the nation to reduce its nuclear arsenal.

"We have taken note of President Obama's call on both Pakistan and India to work together with a view to ensuring that military doctrines do not move in the wrong direction," foreign office spokesman Nafees Zakaria said.

The spokesman said Pakistan is ready to discuss arms control and restraint measures with India and "our proposal of strategic restraint regime" can provide basis for mutually agreed restraint measures and avoidance of unnecessary arms race in the region.

Pakistan is opposed to nuclear and conventional arms race and strongly believes in peace and stability in the region, he said.

"We are committed to minimum deterrence," Mr Zakaria said, adding that Pakistan's nuclear capability was solely for self-defence.

On Friday, Mr Obama had identified South Asia, in particular India and Pakistan, as one area where there is a need to make progress in nuclear security and reduction of nuclear arsenal.

Mr Zakaria claimed that there is increased understanding at the international level of Pakistan's genuine concerns regarding rapidly growing Indian conventional and nuclear capabilities and their offensive military designs such as cold start doctrine.

The spokesman said Pakistan has strong credentials to become a member of Nuclear Suppliers Group (NSG) as a non-NPT state.

The NSG is still deliberating upon the issue of membership for non-NPT states, he said.

*The Asian Age*  
08 Apr, 2016

## **Pakistan seeks Air Force fleet upgrade**

Pakistan wants to upgrade its aging fleet of fighter jets in anticipation of a prolonged battle against Islamist militants, although the purchase of fifth-generation planes would only be a last resort, an Air Force official said.

Pakistan is fighting a Taliban insurgency in its northwest and a separatist insurgency along its Iranian border in the west. In 2014, the military launched a crackdown in the northwestern areas of North and South Waziri-stan and has managed to push back militants into a few pockets.

But its Air Force, which will need to retire dozens of jets over the coming years, lacks the latest technology and relies heavily on a fleet of about 70 US-made F-16s, which are solely capable of carrying out precision targeting.

"Our concern is that we don't know how long these anti-terrorist operations will continue," Pakistan Air Force second-in-command Muhammad Ashfaq Arain said in an interview late on Wednesday.

"We have weakened them (militants) to a great extent, but I don't see an end in the very near future, so all the burden is being shared by the F-16s and its pilots," he said.

Skeptics suspect that Pakistan's military is seeking an improved arsenal to counter the growing military might of India.

*The Statesman*  
08 Apr, 2016

## **International Meet on Peaceful Use of N-Energy**

The Director General of the Bureau of Indian Standards (BIS), Mrs Alka Panda, has called for collective efforts by all stakeholders to ensure that peaceful application of nuclear energy takes into account the security and safety of both mankind and environment.

Inaugurating a conference on peaceful application of nuclear energy, she urged the international community to develop implementable and technically sound standards having global acceptance, to harness potential of nuclear energy to its maximum for peaceful applications.

The BIS is hosting the 20th Plenary and other meetings of the 'ISO/TC 85 Nuclear Energy, Nuclear Technologies and Radiological Protection' for the first time in India. About 150 international and national delegates from 16 countries are participating in these meetings, being organised here from 4-8 April. BIS is the founder member of the International Organisation for Standardization (ISO) and an active member of the International Committee 'ISO/TC 85 Nuclear Energy, Nuclear Technologies and Radiological Protection', which deals with standardisation for peaceful applications of nuclear energy, nuclear technologies and for protection of individuals and environment against all sources of ionising radiations.

During the meetings, subjects such as radiological protection; nuclear waste characterisation; radioactivity measurement and monitoring in environment; siting, designing and operation of power

reactors, decommissioning etc, are being discussed by nuclear experts for formulation of new International Standards.

The meetings provide a platform to the Indian nuclear experts to interact with international experts for appreciation of latest concerns and trends in standardization and identify gap areas for formulation of Indian Standards and for harmonisation with the ISO standards. SNS

*The Times of India*  
08 Apr, 2016

## **Radioactive boars run wild in Fukushima**

*By Will Worley*

Radioactive boars are running wild and breeding uncontrollably in the northern region of Japan contaminated by the Fukushima nuclear disaster. The animals have been devastating local agriculture and eating toxic, nuclear-contaminated food from around the accident site. Mass graves and incinerators have been unable to cope with the quantity of boar corpses, shot by local hunters.

A quarantine zone near the Fukushima Daiichi nuclear plant where a 2011 meltdown leaked radioactive material into the surrounding countryside has been uninhabited by humans since the disaster. However, boars remained in the area, unchecked by humans. Their precise number is unknown, but since 2014, the number of boars hunted has increased from 3,000 to 13,000, The Times reported.

The damage to local farms beyond the quarantine zone caused by the boars has correspondingly increased, amounting to ¥98 million (£620,000) since the accident. The animals are now being killed faster than they can be buried. Three mass graves, big enough for 600 boars each, are almost full in the city of Nihonmatsu, 35 miles from the nuclear plant. There is no more public land on which further mass graves can be dug.

Hunters have buried the carcasses -often weighing carcasses -often weighing 100kg -in their gardens, but they are often dug up by wild dogs. "Sooner or later, we're going to have to ask local people to give us their land to use," said Tsuneo Saito, a local hunter. In desperation, the authorities are resorting to using incinerators to get rid of the corpses, although it has been difficult to find the workers to chop up the remains into pieces small enough to feed into the furnaces. In the city of Soma, a purpose-built incinerator has been developed, complete with filters to absorb any radioactive material released by its cremations. However, even this £1million operation can only dispose of three boars a day. The animals were considered a local delicacy, but the contaminated boars are unfit for human consumption. Tests have shown the contaminated area remains dangerous, with levels of radiation 300 times the safe limit for humans.

*The Times of India*  
07 Apr, 2016

## **HAL develops IV fluid for Siachen soldiers**

Pimpri Chinchwad: Intravenous fluid that does not freeze even at -15°C, useful in Siachen, has been developed by pharmaceutical public sector unit Hindustan Antibiotics Limited (HAL).

Four years after the Defence Research and Development Organization (DRDO) approached the public sector drug manufacturer, the company has also developed three products which will be useful for treatment in case of a nuclear emergency.

Speaking to TOI, KV Varkey, managing director of HAL, said, "DRDO approached the company in 2011 with its wishlist of 15 products out of which we have been successful in developing four."

Siachen is the highest military base in the world at an altitude above 6,000 metres where the temperature comes down to -15 degrees celsius and even lower.

In any emergency involving human lives, doctors find it difficult to provide immediate medical treatment because intravenous (IV) fluids and injectables are in a solid form, Varkey said. They can be melted with great difficulty and precious time is lost in the process, he added.

He said it was an India-specific problem as there is no military base at such high altitudes anywhere in the world. "The volume of business is too small to attract big pharma companies. But HAL has developed a glycerin-based product which prevents freezing. Glycerin formulation extracts fluid out of injured tissues in the brain and lungs thus reducing edema and improving oxygenation," Varkey said.

Another expert in HAL said, "Normal saline will freeze at Siachen base due to the very low temperatures. But we have developed the glycerated formulation containing saline which remains in liquid state at very low temperatures, which can be administered to the injured soldiers quickly and save lives. This saline metabolises fast and gives warmth to the body. We supplied the first batch of this product to the defence forces in 2014-15 and they are carrying out their own studies. Depending on their reports they will place more orders."

The expert said the Institute of Nuclear Medicines and Allied Sciences (INMAS), a division of DRDO had approached HAL which has the only active research and development department among the pharma PSUs. "HAL has developed three products - potassium iodate tablets, Prussian Blue tablets and a skin decontamination kit for people affected in a nuclear emergency. Potassium iodate tablet has to be consumed by the person who has been affected by radiation. It helps excretion of the radioactive material from the body," he said.

He said Prussian Blue tablets also work during nuclear emergencies. "If the skin is exposed to radiation, we wash it off with water. But radioactive material remains in the skin and damages it, leading to cancer. The kit contains various solutions useful in removing radioactive materials from the skin. We have supplied samples of Prussian Blue tablets and the kits to the INMAS," he said.

"We chose the products from the DRDO's wishlist for production in HAL. If we get more funds from the Union government, we will try to develop the other products too," Varkey said.

HAL has submitted a rehabilitation package of Rs 674.33 crore to the Union ministry of chemicals and fertilisers which is awaiting the approval of the Union cabinet.

HAL was the first major company to set up its plant in Pimpri in 1954 which started the industrialisation in Pimpri and surrounding villages. The once profitable HAL turned sick in the 1990s and its employees are facing an uncertain future.

### **The products**

Potassium Iodate is an anti-radiation pill that prevents the thyroid gland from absorbing radioactive iodine during a nuclear emergency.

Prussian Blue is offered by prescription to internally treat people contaminated with radioactive cesium by trapping it in the intestines and keeping it from being reabsorbed by the body.

*The Hindu*  
07 Apr, 2016

## **Universe may be full of monster black holes**

*By Nicola Davis*

*New research forces rethink after a supermassive black hole is discovered at the centre of a large galaxy*

Our universe could be riddled with monster black holes, new research has suggested.

The revelation comes after a black hole with a mass of 17 billion suns was found in a large, virtually isolated galaxy 200 million light years away.

Black holes are referred to as “supermassive” if they have masses of millions or billions of times more than the sun. Supermassive black holes with masses of more than 10bn suns have previously been found at the heart of large galaxies located in dense clusters in the universe. But this is the first time astronomers have found such an object lurking at the centre of a large galaxy in a relatively empty area of the universe.

“We didn’t expect to see such a huge black hole in a small place,” said Professor Chung-Pei Ma, an author of the study from the University of California, Berkeley.

That, she added, opens up an intriguing possibility. With such galaxies more common than rich clusters, such supermassive black holes could be rife.

“What this is saying is that you don’t need these galaxy clusters to grow very massive black holes,” said Professor Poshak Gandhi of the University of Southampton, who was not involved in the study. “That throws a wrench in the works of our understanding of how these monster black holes form — it throws the field wide open.”

Writing in the journal *Nature*, a team of scientists from the U.S. and Germany describe how the discovery of a supermassive black hole at the centre of a galaxy known as NGC 1600 arose from a large study into massive galaxies in the local universe.

Appropriately termed Massive, the study combines data from the Hubble Space Telescope, the Gemini Telescope in Hawaii and the McDonald Observatory in Texas, with the goal of enabling scientists to unpick the secrets of supermassive black hole formation and the relationship of these hefty objects to their galaxy.

By studying the movement of stars within NGC 1600, the astronomers deduced that at the core of the galaxy lies a monster black hole with a mass equal to 17bn suns.

### **Strong gravity**

“Black holes, by definition, are black — they don’t give out light so it is hard to study them. But they have very strong gravity so they will make the stars very close to them whizz around much faster than in their absence,” said Prof. Ma.

“So we needed to study stars at the centre very close to the black hole in order to measure its mass.” In the process, the authors made a further discovery, a dearth of stars in the immediate vicinity of the supermassive black hole. “They seem to be scared to get close to the black hole,” said Prof. Ma.

That, she said, could have arisen when two galaxies merged to form NGC 1600. During the event, they argue, monster black holes at the centre of each galaxy could have moved closer together and begun to circle each other, forming what is known as a binary. The gravitational influence of this system could have destabilised the orbits of nearby stars and hurled them away from the centre of the galaxy like a slingshot.

“Each time they eject a star [the monster black holes] lose a bit of energy and the binary becomes smaller,” said Dr Jens Thomas, an author of the paper from the Max Planck Institute for Extraterrestrial Physics.

“At some point the two black holes are so close to each other that they merge.” But Prof. Gandhi believes further work is needed to back up the suggestion of a binary system. “It is possible, but there is not direct evidence for it at this stage,” he said. — © Guardian Newspapers Limited, 2016

## **First ever robots made of 3D printed solids, liquids**

»In a first, MIT scientists have 3D printed a tiny six-legged robot using a new technique that involves printing solid and liquid materials at the same time, reports PTI from Boston.

The new method allows the team to automatically 3D print dynamic robots in a single step, with no assembly required, using a commercially-available 3D printer.

"Our approach, which we call 'printable hydraulics,' is a step towards the rapid fabrication of functional machines," said Daniela Rus, from Massachusetts Institute of Technology (MIT) in US.

"All you have to do is stick in a battery and motor, and you have a robot that can practically walk right out of the printer," said Rus.

Researchers 3D printed a tiny six-legged robot that can crawl via 12 hydraulic pumps embedded within its body. Printing liquids is a messy process, which means that most approaches require an additional post-printing step such as melting it away or having a human manually scrape it clean.

That step makes it hard for liquid-based methods to be employed for factory-scale manufacturing.

With "printable hydraulics," an inkjet printer deposits individual droplets of material that are each 20 to 30 microns in diameter, or less than half the width of a human hair.

## **'Insect eyes' may allow drones to fly on their own'**

London, PTI: Scientists have developed a system, inspired by insect eyes, that may allow drones to adjust their speed to their surroundings and fly on their own - without human intervention and control.

After studying how insects navigate through dense vegetation, researchers at Lund University in Sweden came up with the system that can be applied to flying robots.

By adapting the system to drones, they can be made to adjust their speed to their surroundings and fly on their own, researchers said.

The research shows how bees that fly through dense forests assess light intensity to avoid other objects and find holes in the vegetation to enable them to navigate safely.

The ability to avoid collisions is crucial to animals and insects that live in environments with many obstacles.

The results show that insects, such as the green orchid bee in the Panama rainforests, apply a strategy where they assess the light intensity to navigate quickly and effectively without crashing.

They are guided by the intensity of the light that penetrates the holes in leaves to determine whether a particular hole is sufficiently large for them to fly through safely without hitting the edges.

"The system is so simple - it's highly likely that other animals also use light in this way. The system is ideal for adapting to small, light-weight robots, such as drones. My guess is that this will become a reality within five to ten years," said vision researcher Emily Baird.

Before it is realised, the biological results from the rainforest must be transformed into mathematical models and digital systems that make it possible for robots to fly in complicated environments completely without human intervention, researchers said.

"Using light to navigate in complex environments is a universal strategy that can be applied by both animals and machines to detect openings and get through them safely.

"Really, the coolest thing is the fact that insects have developed simple strategies to cope with difficult problems for which engineers have still to come up with a solution," said Baird.

*Deccan Herald*  
08 Apr, 2016

## **NASA is facing a climate change countdown**

*By John Schwartz*

*Water, once the solution to many of the space agency's problems, is becoming its biggest threat*

The concrete block perches absurdly atop a piling, elevated about 10 feet above the beach sand. Is it art? A bulky milepost?

Carlton Hall pointed to the puzzling object and explained that it was once a tie-down block for securing structures like antenna towers. Hall, the chief scientist for the Kennedy Space Center's ecological program, said that when he started working here a few decades ago, the block had been buried. Now the sand that enveloped it is gone, swept away by the forces of coastal erosion and storms.

He gestured toward the waves rolling in nearby and said, "The beach used to be at least 50 yards out." On the other side of the dunes, a quarter mile away, sit two artificial hills some 50 feet high. Those are Nasa's 2 biggest launch pads. And to the south sit several smaller ones. This is America's busiest spaceport, and the water is coming.

Like so much of Florida, the Space Coast - a 72-mile stretch along the Atlantic - is feeling the threat of climate change. Some of the erosion is caused by the churning energy of ocean currents along the coastline. Hurricane Sandy, whose power was almost certainly strengthened by climate change, took a big bite in 2012, flattening an already damaged dune line that provided protection from the Atlantic's battering.

A rising sea level will bring even greater risk over time - and perhaps sooner than most researchers expected. According to a study published last week, warming pressure on the Antarctic ice sheet could help push sea levels higher by as much as 5 or 6 feet by the end of this century.

Nasa isn't just a victim of climate change. It contributes to climate science in many ways, and not only in the data from the many satellites that orbit the Earth.

Its astronauts also help build awareness of the growing urgency of climate change. Astronaut Scott Kelly, who recently returned from nearly a year in space, took hundreds of photographs that could seem like abstract art or a dire warning; in an email interview just before his descent, he said that he had seen changes in the planet even since his previous mission in 2010.

"It seems to me there is more pollution in India and China than what I saw last time," he said. "Definitely noticed the fires this summer in the USA; sometimes, could see the smoke all the way to Chicago."

"Weather systems where they are not supposed to be obvious," he added. "The fragility of the atmosphere always apparent."

Nasa, which has at least \$32 billion worth of structures and facilities around the country, has been considering the possible effects of climate change for nearly a decade, said Kim W. Toufexis, a strategist who leads the master planning program for the space agency.

NASA, after all, is in the business of risk management. By 2007, "we had to acknowledge that we should recognize climate change and extreme weather as a formal risk that we should be actually managing," Toufectis said.

With all of its expertise and its ability to make forecasts based on data, Toufectis added, "shame on us if we are not capitalizing on that."

In fact, Nasa's climate risk extends far beyond Florida. About two-thirds of the land that Nasa manages is within 16 feet of mean sea level, and much of it is near the coasts. "We are tremendously linked to the drink," Toufectis said.

Johnson Space Center in Texas sits by Clear Lake, an inlet of Galveston Bay and the Gulf of Mexico. The surge from Hurricane Ike in 2008 caused power failures and debris pileup that shut down the center for a week.

The Michoud Assembly Plant, which built the enormous orange tanks used by the space shuttle, sits at the eastern end of New Orleans, and narrowly missed being inundated in Hurricane Katrina in 2005. Ames Research Center is near San Francisco Bay.

The agency's Climate Adaptation Science Investigators working group, which evaluates risks for all federal agencies, has predicted that sea level rise of 5 inches to more than 2 feet by 2050 could cause widespread problems for the five coastal Nasa sites.

Coastal floods that might now occur once every 10 years could happen twice as often at Johnson, two to three times as often at Kennedy and 10 times more often at Ames.

"Nasa coastal centers that are already at risk of flooding are virtually certain to become more vulnerable in the future," the working group wrote in a 2014 report.

### **The storms to come**

The agency brought together the managers for each center to learn directly from Nasa scientists about climate change risks. They took field trips to the vulnerable areas in 2009.

"It became very real," said Cynthia E. Rosenzweig, senior research scientist at the Nasa Goddard Institute for Space Studies in New York, and an author of the 2014 report.

At Kennedy Space Center, of course, the elements are always a challenge. The air off the sea attacks delicate equipment and rusts structures. Hurricanes occasionally come through, as well. In 2004, Hurricane Frances tore hundreds of siding panels off the gargantuan Vehicle Assembly Building, requiring extensive repairs. Storms in 2007 and 2008 battered the shore.

Then in 2012, Hurricane Sandy sent a surge that hit the coast like a scouring pad, leveling about a mile of dune protection and leaving the landscape stretching toward the launch pads covered with sand.

Already, Nasa has spent much of a \$3 million appropriation to rebuild a long dune to replace protective sands that have been washed away.

No one doubts that more storms will come, and the warmer air and water brought by climate change are likely to lead to more destructive storms.

As climate change threatens, Nasa has options that include hardening facilities against the rising seas with barriers and structures adapted to storms and flooding, or if adaptation is not possible, to strategically retreat. Any such strategies will be expensive - though how expensive at this early stage is anyone's guess.

Retreat, however, is hardly an option any time soon for an agency that would need billions of dollars for new buildings and equipment alone - not to mention the need to relocate staff with extensive expertise.

One thing is certain: Launch pads will still be needed. Kennedy Space Center will be the home to Nasa's next-generation human spaceflight vehicles, and its pads are being used by private space companies like SpaceX and United Launch Alliance.

Launching over water is safer than over land and people. Also, rockets are best launched from sites closer to the Earth's fat equator, where the greater diameter of the planet provides a slingshot effect that gives each rocket more bang for the propulsion buck.

And that is the conundrum for Nasa. Water, once the solution to many of the space agency's problems, is becoming its biggest threat.

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## **Innovation needs no patent protection**

*The new CRI guidelines are merely a recognition of what the world at large has concluded, that patents make no sense in the world of software*

Most of the public objections to the new Computer Related Invention (CRI) guidelines issued by the patent office, clarifying that only software involving novel hardware is patentable, have come either from the legal fraternity which is terrified about the loss of business (no patents, no patent litigation), or from multinational corporations (MNCs), with business models based on proprietary software, trying to stay relevant in the fast-changing world of collaborative engineering and open-source software. These guidelines, according to them, will supposedly result in the stifling of innovation, for reasons unexplained. It is not as if the law has been changed; the guidelines merely seek to clarify the intent of the existing Patents Act. On the contrary, Indian start-ups, product companies and research organisations, which are at the forefront of innovation, have widely welcomed the guidelines, having never been interested in patent protection. This lays to rest the myth of the guidelines being detrimental to Startup India.

Technologies we use in our day-to-day lives — Web browsers, Facebook, Twitter, Linux-based mobile phones and set-top boxes, online shopping — are all based on open source and do not rely on patent protection. Even Apple, which enforces its design patents with vigour, has always used open source at its core. It is also ironic that while the Linux foundation itself does not support patents, some companies that make use of Linux have opposed the CRI guidelines.

### **Open-source is the future**

Innovation is happening in India primarily because of the lack of distraction from patents. The government-funded SHAKTI processor programme at IIT-Madras is creating open-source mobile and server processors to replace proprietary processors. The LightStor storage system lab is creating brain-inspired processors, next-generation mobile phones, micro-kernel operating systems and secure networking standards. iSPIRT's work in creating an open Indian stack for banking, unencumbered by patents, is an effort that can radically transform the banking and payment industry.

Indian software service companies, barring Infosys, have maintained an understandable silence in public. On the one hand, the attractive world of patent-free open-source software beckons, a world that is the future of the Indian services industry, but the still lucrative relationship with legacy MNCs is difficult to let go. This relationship will not allow public opposition to software patents.

The supporters of the new CRI guidelines include a range of academics, organisations like Society for Knowledge Commons, Free Software Movement of India, Software Freedom Law Centre (SFLC) and iSPIRT, software start-ups and product companies. The patent office has been unfairly criticised of coming under the influence of SFLC and the bogeyman of a “foreign” NGO has been used for scaremongering. The world of open source owes a lot to Eben Moglen, the man who founded SFLC and one of the key persons behind GNU General Public License (GPL). Linux and Android, and by inference India’s mobile revolution, exist in their current form because of his work. The GPL has been the most effective weapon in the fight for truly free software, and it has been key in breaking abusive monopolies that have long dominated the field of software. The patent office took a balanced view of all petitioners before arriving at its opinion. The CRI guidelines are merely a recognition of what the world at large has concluded, that patents make no sense in the world of software.

### **Patents as a drag**

The lack of clear boundaries in software means that even law-abiding software developers who intend not to violate another’s patent have no clear means of avoiding it. With 15,000-plus e-commerce patents (2010) in the U.S. alone, it is not possible to eliminate the risk of a patent infringement lawsuit. Frivolous lawsuits by U.S. patent trolls account for nearly 38 per cent of all patent litigation in the U.S. The problem of software patents ends up increasing the cost of software for all of society.

The history of the software industry shows that innovation flourished long before software patents. The key technologies of the Web have been embodied in patent-unencumbered software. CERN, the European Organisation for Nuclear Research, committed the Web’s fundamental technologies, including initial Web-serving and Web-browsing programmes, to the public domain. The Web exists because of this contribution. The flexibility and sophistication of the Web we use today depends on freely available scripting languages, such as Perl and PHP, invented by developers who deliberately did not seek patent monopolies for them. Facebook runs on PHP. The current generation innovators — various open-source foundations like the Mozilla, Linux and Apache foundations, Facebook, eBay, LinkedIn, Tumblr and innumerable other start-ups — all share the same credo: royalty-free open source.

The new breed of Indian start-ups will come from the world of big data and machine learning, from the world of mobile apps and e-commerce, and the world of cloud computing. The underlying platforms for all these areas are patent-safe, open-source software tools.

Given the lessons of history and considering the amount of litigation that software patents have created in the U.S., the new CRI guidelines will help India from going down this slippery slope. As with any other monopoly, a patent must be treated with great discretion, especially since this particular monopoly is bestowed by the state itself. It is time we ignored software patents and focussed on the business of innovation. India will have to find its own way to innovate, both in software and patent law, unencumbered by external advice and ignoring legal crutches from foreign jurisdictions.