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Govt sets up Dept of Military Affairs to be headed by Chief of Defence Staff

While the government is yet to announce the name of the first CDS, Army Chief General Bipin Rawat is the front-runner for the post. He retires as army chief on December 31

By Rahul Singh

New Delhi: The government on Tuesday cleared the appointment of India's first Chief of Defence Staff (CDS) who will be a four-star officer and head the department of military powers in the defence ministry, Union minister Prakash Javadekar announced at a cabinet briefing. The development, perhaps the most significant reform in top military management in India, comes four months after Prime Minister Narendra Modi announced in his Independence Day speech the creation of the post for more effective coordination between the three armed forces.

The appointment of the CDS — pending for almost two decades after the Kargil Review Committee recommended it — is a major reform in India's higher defence management, Javadekar said. The CDS will have the same salary and perquisites as the three service chiefs (who are also four-star officers), he added.

The government is yet to announce who will be the country's first CDS, but army chief General Bipin Rawat is widely believed to be the front-runner for the post. His term as army chief ends on December 31 and the government is likely to name the CDS before that, said two senior government officers, asking not to be named.

Defence minister Rajnath Singh tweeted that the decision to create CDS was a major step towards bringing about jointmanship between the armed forces and with the decision, the government had fulfilled the commitment given by PM Narendra Modi on August 15.

"In a historic decision for ushering in reforms in the higher defence management in the country, the Government has decided to create a post of Chief of Defence Staff and to create a Department of Military Affairs, within the Ministry of Defence (MoD)," he said in another tweet.

A defence ministry statement said while the CDS would act as the principal military adviser to the defence minister on all tri-services matters, the three service chiefs would continue to advise the minister on matters exclusively concerning their respective services. "The CDS will not exercise any military command, including over the three service chiefs, so as to be able to provide impartial advice to the political leadership," the ministry said in a statement. Still, it is expected that the CDS will be a first among equals, also because he will be senior to all the other chiefs in terms of service.

The statement said that apart from heading the department of military affairs, the CDS will also be the permanent chairman of the Chiefs of Staff Committee (CoSC). Until now, the chairmanship of the CoSC was held in rotation by the senior-most service chief for short periods and the arrangement was found to be unsatisfactory.

The ministry said the new department of military affairs will focus on promoting jointness in procurement, training and staffing for the three services through joint planning and integration of their requirements. The department will also facilitate the restructuring of military commands for optimal utilisation of resources by bringing about jointness in operations, including through establishment of joint/theatre commands. The ministry said the CDS would also function as the military adviser to the Nuclear Command Authority.

“It is expected that this reform in the higher defence management will enable the armed forces to implement coordinated defence doctrines and procedures and will go a long way in fostering jointmanship among the three services,” the statement said.

The implementation committee, appointed by Prime Minister Modi and headed by national security adviser Ajit Doval, has defined the charter for the CDS. This is in line with what was recommended by the K Subrahmanyam-led Kargil Review Committee (KRC). The committee’s report was tabled in Parliament in February 2000. The late Subrahmanyam was the father of India’s current foreign minister S Jaishankar.

The KRC recommended the appointment of a CDS as a means to provide single-point professional military advice to the political leadership and also get the forces to work together. After the Kargil war, a Group of Ministers (GoM) also strongly recommended the creation of CDS in 2001. But successive governments failed to build political consensus around the CDS before PM Modi on August 15 announced the creation of the post.

“The CDS will be a game changer in terms of resource optimisation, jointness and capability enhancement of the military. Some teething troubles may be there initially as it is a new role but things will stabilise as we move along. Other militaries have faced such challenges. The CDS will also bring about a better interface with the bureaucracy,” said Lieutenant General Satish Dua (retd), who was the senior-most military officer handling all tri-service affairs until November 2018. Dua retired on October 31, 2018, as Chief of Integrated Defence Staff to the Chairman, Chiefs of Staff Committee (COSC) after holding the top post for two years.

“Hopefully, the CDS will now have more control over funds and an ability to prioritise procurements. The fine print needs to be studied in detail,” said Air Vice Marshal Manmohan Bahadur (retd), additional director general, Centre for Air Power Studies.

The existing structure for cross-service cooperation — the Chairman, COSC — is weak and susceptible to pulls and pressures from the service that the chairman belongs to, said two military officials, asking not to be named.

The CDS will not be parochial and will be guided by the interests of the three services and not just his own, which was mostly the case with the chairman, COSC, said the first official cited above. The CDS will also have a fixed tenure unlike the rotating post of chairman, COSC, who is the senior-most service chief and holds the dual charge for a few months, said the second official.

“Take the case of General Bipin Rawat who took over as chairman, COSC from Air Chief Marshal BS Dhanoa when the latter retired on September 30. Rawat will be chairman, COSC for just three months as his term as army chief ends on December 31. There’s little one can do in such a short time-frame,” he said.

General (retd) VP Malik, who was the army chief during the Kargil War, tweeted: “Cabinet note on charter of CDS is visionary, comprehensive & on desired lines. Should take care of ‘business rules’ anomalies. Service Chiefs already senior to GOI Secys, equated with Cab Secy. Responsibility of CDS & Def Secy to workout smooth interaction between Civ & Mil Deptt.”

<https://www.hindustantimes.com/india-news/govt-sets-up-dept-of-military-affairs-to-be-headed-by-chief-of-defence-staff/story-eIC4HPpbexJgGtpEfMaLI.html>

7 things to know about the Chief of Defence Staff and why it was needed

The CDS will not exercise any military command, including over the three service chiefs, so as to be able to provide impartial advice to the political leadership

New Delhi: The National Democratic Alliance (NDA) government has green-lit the appointment of India's first Chief of Defence Staff (CDS) who will be a four-star General and head the newly-created department of military affairs in the defence ministry.

The development, perhaps the most significant reform in top military management in India, comes four months after Prime Minister Narendra Modi announced in his Independence Day speech the creation of the post for more effective coordination between the three armed forces.

As the government gets ready to announce who will be the country's first CDS, here are seven things you must know about the new appointment and why it was needed:

While the CDS would act as the principal military adviser to the defence minister on all tri-services matters, the three service chiefs would continue to advise the minister on matters exclusively concerning their respective services i.e. army, navy and the air force. The CDS will have the same salary and perquisites as the three service chiefs (who are also four-star Generals).

The CDS will not exercise any military command, including over the three service chiefs, so as to be able to provide impartial advice to the political leadership. Apart from heading the department of military affairs, the CDS would also don the hat of Permanent Chairman of the Chiefs of Staff Committee (CoSC). Until now, the chairmanship of the CoSC was held in rotation by the senior-most service chief for short periods and the arrangement was found to be unsatisfactory.

The department of military affairs would focus on promoting jointness in procurement, training and staffing for the three services through joint planning and integration of their requirements. It will also facilitate the restructuring of military commands for optimal utilisation of resources by bringing about jointness in operations, including through establishment of joint/theatre commands.

The appointment of a CDS was one of the most significant recommendations made by the K Subrahmanyam-led Kargil Review Committee (KRC) that was constituted in the immediate aftermath of the 1999 Kargil war to examine lapses that allowed Pakistani soldiers to occupy strategic heights, the initial sluggish Indian response, and suggest measures to strengthen national security. The KRC report was tabled in Parliament in February 2000.

A year later, in February 2001, a Group of Ministers (GoM), under then home minister LK Advani, submitted its report to then Prime Minister Atal Bihari Vajpayee. The GoM was set up in April 2000 to review the national security system against the backdrop of the KRC recommendations. It recommended that a CDS be appointed. But the Cabinet Committee on Security (CCS) decided that the appointment of a CDS be taken up later after holding talks with different political parties.

Successive governments failed to build political consensus on appointing a CDS for almost two decades. However, Prime Minister Narendra Modi on August 15 this year announced the creation of the new post. The appointment of a CDS will address the fragmented approach of the armed forces and bring about much-needed synergy. The existing model for cross-service cooperation (chairman, CoSC) was weak, with each service working in its own silo. The efforts for jointmanship in the military were proceeding slowly, resulting in duplication of efforts, wastage of resources and delay in decision making.

Just like the service chiefs, the CDS will be a member of the Defence Acquisition Council and Defence Planning Committee. He will not be eligible to hold any government office after demitting the office of CDS. Also, there will be no private employment for him without prior approval for a period of five years.

<https://www.hindustantimes.com/india-news/7-things-to-know-about-the-chief-of-defence-staff-and-why-it-was-needed/story-MFTjfwkEGxzMhTncCo8jdO.html>

Kargil panel first to raise need for overarching military advice

The KRC recommended the creation of a CDS as a means to provide single-point professional military advice to the political leadership and to also achieve synergy in the working of the three forces

By Rahul Singh

New Delhi: The appointment of a CDS was one of the most significant recommendations made by the K Subrahmanyam-led Kargil Review Committee (KRC) that was constituted in the immediate aftermath of the 1999 Kargil war to examine lapses that allowed Pakistani soldiers to occupy strategic heights, the initial sluggish Indian response, and suggest measures to strengthen national security.

The KRC recommended the creation of a CDS as a means to provide single-point professional military advice to the political leadership and to also achieve synergy in the working of the three forces. The KRC was perhaps the most comprehensive look at the systemic failures that allowed the Pakistanis to occupy the strategic heights of Kargil.

The chiefs of staff simultaneously discharge the roles of operational commanders and national security planners especially in relation to future equipment and force postures, the KRC report said. In recommendations dealing with national security management and apex-decision making, the report said, “Most of the time (of the chiefs) is, however, devoted to operational role, as is bound to happen. This has led to a number of negative results. Future-oriented long term planning suffers,” the report said.

It said structural reforms could bring about a much closer and a more constructive interaction between the government and the three services. Some experts had questioned the degree of coordination between the army and air force during the Kargil war.

The committee looked at the problems dogging the military, its higher defence organisation, the intelligence community and the inadequate management of India’s land and maritime borders.

In a report tabled in Parliament in February 2000, the KRC recommended the appointment of a CDS as it felt that the then existing system of service chiefs giving military advice to the government independent of each other was inadequate.

A Group of Ministers (GoM) was set up in April 2000 to review national security in its entirety, with particular focus on the recommendations of the KRC and submit a report. In its report, submitted in February 2001 to the Prime Minister, the GoM backed the creation of the post of CDS.

Accepting the KRC’s recommendation, the GoM backed the creation of the CDS, who would control and manage strategic forces, ensure prioritisation of defence planning and bring about much-needed jointness amongst the armed forces.

However, the appointment of a CDS was in limbo for almost two decades as successive governments failed to build a political consensus over it. The complete overhaul of India’s intelligence set-up and the creation of a younger and fitter army are among the most significant changes made by the government on the basis of recommendations of the KRC.

Some steps have been taken to improve jointness among the three services during the last two decades such as the creation of the HQ of the Integrated Defence Staff (IDS) and the raising of India’s first tri-service command – the Andaman and Nicobar Command.

Created 18 years ago, the IDS is a single-point organisation for jointmanship that integrates policy, doctrine, war-fighting and military purchases.

However, the creation of the post of CDS was in the freezer till Prime Minister Narendra Modi revived the idea in August 2019.

“It’s better late than never. The world has changed and so have war-fighting scenarios and challenges. The CDS is absolutely required for greater connectivity and synergy among the three services. Had we had a CDS during the Kargil war, we could have utilized our resources, including the air force, much better. And the outcome of the war would have been different. We would have punished Pakistan,” said Lieutenant General DB Shekatkar (retd), who recommended the appointment of a CDS in report submitted to the government in December 2016.

<https://www.hindustantimes.com/india-news/kargil-panel-first-to-raise-need-for-overarching-military-advice/story-tlSrRMuoeTnaMJkzFQdvmO.html>

PARLIAMENTARY COMMITTEE'S RECOMMENDATIONS

'Form CDS-led Panel to Review Defence Procurement Plans'

Suggestion to monitor 3 types of plans which will be implemented by chief of defence staff

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New Delhi: A parliamentary panel has recommended constitution of a high-powered committee to monitor the three types of plans of the defence procurement procedure which will be implemented by the chief of defence staff (CDS).

The recommendation was made in one of the reports of the Standing Committee on Defence, submitted to the Lok Sabha Speaker

last week.. The reports, accessed by ET, say that the committee will have the final say in the decisions taken under these plans. The panel has also suggested that additional funding be given to the Integrated Defence Staff (IDS)—which comprises personnel from the army, air force and navy—for it to be able to meet its operational requirements. The IDS will function under the CDS. The panel has also suggested raising the level of indigenisation to cut dependence on imports. One of the tasks of the CDS is to promote use of indigenous equipment by the armed forces. The parliamentary panel's recommendation on constitution of a committee comes in the backdrop of the five-year defence plans facing "indifference" of the defence ministry and "non-approval" by the finance ministry.

Proposals for acquiring capital as-



The Way Forward

RECOMMENDATIONS ON CONSTITUTION OF A COMMITTEE COME IN THE BACKDROP OF THE FIVE-YEAR DEFENCE PLANS FACING "INDIFFERENCE" OF THE MINISTRY

Panel suggests that additional funding be given to the Integrated Defence Staff

Proposals for acquiring capital assets flow out of the defence procurement process

Scope of this committee should be widened to look into national security doctrines and decide acquisitions according to the changes in the world security scenario

sets flow out of the defence procurement process, which has three types of plans—the 15-year Long-term Integrated Perspective Plan (LTIPP), five-year Services Capital Acquisition Plan (SCAP), also known as the Five-year Defence Plan, and the Annual Acquisition Plan (AAP). The LTIPP is split into three five-year SCAPs, which indicates the list of equipment to be acquired by the three services in view of operational requirements and funds. These are then split into two-year roll-on AAPs. One of the main roles of the CDS—whose post and charter was approved by the Union Cabinet on Tuesday—will be to implement these plans.

"The committee cannot comprehend the reason for non-approval of the defence plans (read as five-year ones) by the finance ministry and indifference of the ministry of defen-

ce towards it," the parliamentary panel said in a report.

It is learnt that although the 12th such plan was approved by the defence minister, it was not acceded to by the finance ministry. The defence ministry pointed out to the committee that non-approval of defence plan doesn't hinder the implementation of defence projects. "It is surprising for the committee to know the rationale given by the ministry that the plan does not act as hindrance in the implementation of defence projects...If that is the matter, then there was no need for formulating any plan in the first place," it said.

"The ministry should consider afresh and invariably try to take some sort of consent from the ministry of finance so that the plans get a teeth at the time of implementation," the parliamentary panel said.

MiG 27 to pass into history, its last squadron to be decommissioned in Jodhpur on Friday

The storied fighter had earned the nickname of 'Bahadur' from pilots owing to its exploits during Kargil

Jodhpur: Indian Air Forces's "lethal" fighter aircraft Mig-27, which proved to be "ace attacker" during the 1999 Kargil war and earned nickname of 'Bahadur' from pilots, are all set to pass into the glorious history of country's air force on Friday when their last squadron of seven planes will have its last sortie from Jodhpur air base.

"The squadron of seven MiG 27 will have its last sortie from Jodhpur Air Base on December 27. All the planes of this squadron will be decommissioned on this day, after which none of them would be flying anywhere in the country," said defence spokesperson Col Sombit Ghosh on Tuesday, announcing the scheduled decommissioning of Russianmade MiG 27 aircraft from the South West Air Command.

A New Delhi-based IAF officer said the Jodhpur-based squadron of MiG 27 is the last one not only in SWAC but in the entire country.

"After decommissioning of MiG 27's last squadron from Jodhpur air base, the aircraft will pass into history not only in India but in the entire world. No other country operates MiG 27 now," said the officer, requesting anonymity.

Colonel Ghosh said though the exact fate of this MiG 27 squadron planes is not yet known, but mostly after decommissioning, the planes are either used as souvenirs or returned to the base or depot or even could be given to some other country.

Jodhpur had two squadrons of MiG 27, of which one had been decommissioned earlier this year, he said.

This is the only squadron left now known as Scorpion 29 comprising seven upgraded MiG 27 at Jodhpur Air Base, he added.

Before this, two squadrons of MiG 27 had been decommissioned from Hashimara air base in West Bengal.

According to Ghosh, a ceremonial adieu would be accorded to this glorious and "lethal fighter aircraft" of the IAF at Jodhpur.

Sources said all fighter pilots of MiG 27 will assemble at the base to fly the last sortie of the plane in various formations and a salute will be accorded on landing.

<https://economictimes.indiatimes.com/news/defence/mig-27-to-pass-into-history-its-last-squadron-to-be-decommissioned-in-jodhpur-on-friday/articleshow/72963986.cms?from=mdr>



No classified files should be in e-office format: Govt manual

The latest central govt manual says that no classified files should be in e-office format.

It also firms up the clauses to ensure confidentiality of official communication, even as it opens up VPN based access to e-files to deputy secretaries of t...

By Anubhuti Vishnoi

New Delhi: With many central offices taking digital or paperless route, the government is making extra efforts to ensure that classified information stays 'confidential' and 'secure'. The latest central government manual says that no classified files should be in e-office format. It also firms up the clauses to ensure confidentiality of official communication, even as it opens up VPN based access to e-files to deputy secretaries of the government of India. Over 1.45 million government files from 84 ministries and departments are currently in the e-office format.

The rule book that minutely dictates the functioning of every central government office and the movement of a typical government file is known as the Central Secretariat Manual of Procedure (CSMP). The 16th edition of this manual, which integrates E-office with the conventional government office, was released on Wednesday but with much caution and precaution in place. The latest version of the 1955 manual says 'no classified information shall be handled through e-office.' It specifies that 'classified' documents shall strictly be carried out only in a standalone computer or connected on a "dedicated network air gapped from internet."

With the government machinery over-stretched and file movement dictated by strict rules, the centre has also agreed to open its 'Virtual Private Network' to deputy secretaries to the Government of India. It will allow an officer of the deputy secretary level to work on the office file after office hours and from home. This increased access to the government communication system also comes with due riders. VPN access will be for working on non-classified e-files only and the issuance of VPNs will also be done with due diligence and security reviews. National Informatics Centre is to introduce additional security features for secure VPN use as well.

The revised manual says no government servant except under special orders communicate "directly or indirectly any official document or any part thereof or classified information to any government servant or any other person to whom he is not authorised to communicate such document or classified information". Government records are generally categorised into three types - Category A (files of historical importance which must be permanently preserved and microfilmed), Category B (files which need to be permanently preserved but not microfilmed) and Category C (files that are to be kept for a specified period: usually 10 years). However, it has now been decided the e-files will be recorded only under two categories - A and B.

<https://economictimes.indiatimes.com/news/politics-and-nation/no-classified-files-should-be-in-e-office-format-govt-manual/articleshow/72973734.cms>

Giving Access
Centre to open its 'Virtual Private Network' to deputy secretaries to the Govt of India

VPN access will be for working on non-classified e-files only. Issuance of VPNs will be after due diligence and security reviews

Over 1.45 million government files from 84 ministries and departments currently in e-office format

ISRO'S 2020 target: Sun mission, Gaganyaan test-flight, mini-PSLV test and 10 sat launches

By Surendra Singh

New Delhi: Indian Space Research Organisation (Isro) will aim to touch new heights in 2020 as it is planning to launch around a dozen key satellite missions, high-profile interplanetary mission Aditya (sun) and first unmanned test-flight of the Gaganyaan mission carrying a humanoid.

Talking to TOI, ISRO chairman K Sivan said, "We are targeting to launch over 10 satellite missions next year. They will include advanced communication satellites Gisat1 and Gisat-12R and earth observation satellites Risat-2BR2 and Microsat (for surveillance). We are also targeting to launch Aditya L1 (sun) mission by mid-2020 and the first unmanned testflight of Gaganyaan in December."

The Aditya L1 mission will be the country's first solar mission that will help scientists study solar corona. The Isro chief said, "A PSLV will be used to carry the spacecraft and the work on the satellite is currently going on." The 400kg-class satellite, which will carry six scientific payloads, will be inserted in a halo orbit around the Lagrangian point 1 (L1), which is 1.5 million km from the Earth, so that there is a major advantage of continuously viewing the Sun without any eclipse.

On two other significant missions, Sivan told TOI, "The test-flight of reusable launch vehicle (RLV) and the first development flight of newly-developed Small Satellite Launch Vehicle (SSLV or mini-PSLV) are likely to be launched by early next year."

The RLV technology will help the space agency reuse first and second stages of a rocket so that it can reuse them to cut cost and carry heavier payloads. The first rocket stage will be recovered on a vertical landing spot on the sea like Elon Musk-promoted American company Space X has been doing it with its Falcon rocket. For recovering the second stage, Isro is developing a winged body like a space shuttle. This shuttle will be attached as a second stage in a rocket. It will carry the top portion of the rocket comprising a satellite to space. Once it injects the satellite in its orbit, the shuttle will glide back to the Earth and land on an airstrip.

The SSLV project is actually a vehicle-on-demand that has been developed keeping in mind the half-a-billion-dollar small satellite market. SSLV weighs just 110 tonnes, which is 1/10th the mass of a

BIG LAUNCHES NEXT YEAR

- Over 10 satellite missions, including new-age communication sat Gisat and surveillance sat Risat-2BR2**
Objective: Boost space-based communication and surveillance system
- Aditya L1 (solar) mission | Mid-2020**
Objective: Meant to study solar corona in visible & near IR bands
- Reusable launch vehicle | Early 2020**
Objective: To help Isro reuse first and second stages of a rocket
- Small Satellite Launch Vehicle testflight | Early 2020**
Objective: Mini-PSLV will cut cost and allow quick launch
- Gaganyaan first unmanned testflight | Dec 2020**
Objective: Will carry a humanoid (robot) to space to prepare for Dec 2021 manned mission to space

PSLV. It can be assembled in just 3-5 days as compared to 40 days for a PSLV and can carry a payload of up to 500kg to the low earth orbit, making it ideal for launching small satellites.

At the end of the year, Isro will try to launch the first test-flight of the Rs 10,000cr Gaganyaan mission. A modified GSLV MKIII will carry a humanoid (a robot with human features) to space and scientists will monitor the activities of the humanoid in order to prepare for the manned mission later. The first test-flight will be followed by a second unmanned mission in July 2021 and finally the human spaceflight mission in December 2021 in which three Indian astronauts or Gagannauts will be sent to space for 5-7 days for performing various space experiments in space. The three Gagannauts, enclosed in a crew module mated to a service module in space, will finally be brought back to the Earth after a week in space.

<https://timesofindia.indiatimes.com/india/isros-2020-target-sun-mission-gaganyaan-test-flight-mini-pslv-test-and-10-sat-launches/articleshow/72931226.cms>

THE FUTURE JUST HAS BEEN SHAPED

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Humankind has always been fascinated by intelligent (and self-aware) automata. It has wanted to capture the stars forever. And it has been fascinated by ways to overcome death. History will remember the decade of the 2010s (2010-2019), which will end soon, as the one that saw all three move from the realm of science-fiction to science. Then, fiction has always been about the improbable, not the impossible, as opposed to fantasy, which is about the impossible.

There will no doubt be other essayists attempting pieces similar to this, and it's entirely possible that they will focus on more practical technological advances, but from the perspective of high science (and not technology), it's difficult to imagine anything as significant as these three.

One, machines that can think, and also learn to think (although we are still some time away from those that are self-aware).

Two, the colonisation of space.

Three, extending lifespans to 100 years, maybe more.

As humankind enters 2020, it has made huge strides in the first, artificial intelligence; put in place the building blocks of the second (commercial space travel is now a given; it's only a matter of time before the first humans settle on Mars); and discovered CRISPR-Cas9, a technology, which, if it is allowed to progress towards its logical denouement, will mean the next generation (if not this one) could live into the 100s.

Never before in human history have three such happened in the course of a decade.

Never.

More excitable people can continue to marvel over the latest phone, which boasts of more computing power than yesterday's supercomputer did; or batteries that can store solar energy and power an entire city block, but none of these figure in the - with due apologies to Shelley - look-on-my-works-ye-mighty-and-despair category. [There's a reason Alan Moore named his smartest man in the world Ozymandias].

WHAT HAPPENED?

In 2010, a start-up called DeepMind was founded in the UK. Now owned by Alphabet (Google's parent), it is best known for helping

software learn how to play games, including those as complex as Go. Deep learning and machine learning are not new, but it was only in the 2010s that, primarily thanks to these (and also the emergence of Big Data) that software started doing better than humans at various activities - such as image recognition.

The first time this happened was in 2011 and the first Convolutional Neural Network (or CNN) to do this was developed at a Swiss research institute. Then, in 2012, another CNN, AlexNet did far, far better than humans ever could have in ImageNet's image recognition challenge. Around the same time another CNN won Merck's molecular challenge and accurately identified the biomolecular target of a drug. There's been no looking back since. Software and machines are still not self-aware, although deep learning has helped them put up a pretty good pretence of being that.

WHAT HAPPENED?

In 2012, two papers, published separately, and based on independent research highlighted the gene-editing powers of CRISPR-Cas9. By 2013, papers were being published on the use of CRISPR to edit the human genome in a laboratory setting. By the middle of the decade, experiments were being conducted on the use of CRISPR to cure a variety of ailments; some scientists were also experimenting with its usage in food crops. CRISPR is still not 100% effective or accurate. And, of course, given how close it comes to Eugenics - yes, the technology makes it possible for the passing on of a preferred genetic trait to the next generation - there is the ethical question. Can CRISPR be used to create a race of superhumans? Can it be used to extend lifespans and cure ailments once considered incurable?

HUMANKIND HAS MADE HUGE STRIDES IN ARTIFICIAL INTELLIGENCE; PUT IN PLACE THE BUILDING BLOCKS OF COMMERCIAL SPACE TRAVEL; AND DISCOVERED A TECHNOLOGY WHICH COULD MEAN THE NEXT GENERATION (IF NOT THIS ONE) COULD LIVE INTO THE 100s

The answer to both would be in the affirmative.

WHAT HAPPENED?

It was in the 2010s that two men of significant means, Jeff Bezos and Elon Musk, turned their attention to the colonisation of space. Specifically, Bezos wanted to make it possible to have settlements on the moon, and Musk Mars.

Musk's big idea is terraforming (or making a planet Earth-like), and Bezos's is O'Neill cylinders, named after Gerard O'Neill, a physicist who, inspired by the US space programme, became a pioneer in space colonisation efforts. His cylinders were giant spinning capsules that mimicked Earth's gravity. The science for both O'Neill cylinders and terraforming is yet to be perfected, but what the 2010s witnessed was the creation of two technologies that are basic building blocks of space colonisation - reusable launch vehicles and 3-D printing, which makes it possible for someone in space to make the things they will need to live in space (or on another planet). Made In Space Inc launched one such printer in the International Space Station in 2014 - the company's premise is that space lends itself to more efficient manufacturing.

Smarter-than-human machines; older-than-ever-before humans; and a very real probability that Mars may be a human colony (not perhaps in the next decade, but who's to say) - it's very unlikely that, back in 2009, anyone writing about the coming decade of the 2010s would have foretold any of this.

It's entirely within the realm of the possible (and the marginally probable) that someone authoring an essay such as this in 2029 may speak of the decade of the 2020s as the one where superior machine intelligence forced a growing human population to take to the stars.

It's only apt, given the focus of this essay, that we are now discussing 2029. That's the year when computers are expected to pass the Turing test, which assesses whether or not a machine can think like a human. That milestone is an important one in the march to what experts call the singularity (or the technological singularity), when machine intelligence will exceed human intelligence. According to futurist Ray Kurzweil, the year 2045 is when the singularity will be reached and it is when "human life will be irreversibly transformed".