

EDITOR'S TAKE

[DART] Right Between the Eyes

Right between the Eyes was an energetic pop song released in the mid 80's by British New wave duo Wax, as part of their first album *Magnetic Heaven*. And it was starting like this:

Your love for me was nothing but a mystery Just something only captured in a dream Whoa, then suddenly It was hitting me Right between the eyes, oh....

This is most probably what Dimorphos - a 160-meter-wide asteroid who until this week had been quietly circling the universe for millions of years - thought, after having collided with a 550kg human-made device, manufactured and launched by NASA for that very purpose a few years earlier. The name of the device as well as of the Mission was DART standing for Double Asteroid Redirection Test - and it was a success. After 10 months of a 470mn mile journey, the spacecraft valued at \$330mn - crashed into the asteroid at a speed of 6.6km.sec. Such figures puts the cost per mile of the mission at an apparently affordable \$0.7! But as the final impact was livestreamed thanks to a small camera mounted on the suicide spacecraft, that also makes the broadcast final minutes much, much more expensive! It was spectacular indeed. As recalled by Aviation Week, the collision was previously described by one DART's program scientist, as "a golf cart traveling at 15.000nm an hour smashing into the side of a football stadium" ... Or as Andrew Gold, Wax singer, used to say

> You, you shattered my resistance, yes its true You battered my defenses what could I do?
> I'm running from the heat between me and you You hit me with a million volts
> You nail me with a lightning bolt Oh baby, you knock me cold
> You're love zapped me, right between the eyes....

More seriously, NASA's intent was to test the feasibility of a planetary defense system that would deviate the trajectory of a celestial object potentially on course to hit the globe. The mission was to demonstrate the necessary accuracy and velocity to possibly alter its course of a massive space object. Considering the hypersonic speeds and the distances at stake, it sounds a bit like the metaphor used for the early days Missile Defense challenges: *"hitting a bullet with bullet"*. NASA mission systems engineer Elena Adams described the strike as **"basically a bull's-eye"**. So – a bit like Wax's song - the first part of the mission was a... hit! But did the spacecraft actually altered anything more than itself? That should be determined in the next few weeks. Depending on the results, a follow-on of the DART mission could be to determine the appropriate kinetic effect to be applied on a potential threat in order to avoid any future *Armaggedon* (movie reference intended) coming in the form of an asteroid and make it sing with Wax:

 And now each time I think about you I don't know how I ever did without you, spin me 'round And I'll never get my feet back on the ground? I'm running from the heat between me and you "The Bulletin" is a publication by ADIT focusing on international Aerospace & Defense markets. Here, you will find a digest of short analysis and a selection of news, picked around the world over the last 7 days.

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On Sept. 27, *Eviation Aircraft* successfully completed the first flight of its zero-emission *Alice* airplane. The purely electric aircraft With 3600 kg of batteries on board took off at 7:10 a.m. from Grant County International Airport in Moses Lake, Washington, and managed to fly for 8 minutes at 275 km/h (*Credit: Eviation*)



On Sept. 26, *Northrop Grumman* announced it is developing a unique full-scale demonstration vehicle - inspired by the *Manta Ray* shape. - using several novel design attributes, under a Phase 2 contract award by *DARPA* that began in 2020. *Manta Ray* will be able to anchor to the seafloor in a low power state while harvesting energy from the environment and bring "strategic surprise" to the battlefield. *(Credit: Northrop Grumman)*

POINTS OF VIEW USA: What Matternet's M2 UAS type certification means for UCAs

On Sept. 07, **Matternet**, a California-based developer of commercial drone delivery systems for urban and suburban environments, was awarded Type Certification by the U.S. FAA for its **M2 drone** delivery system, a four-rotor copter able to carry up to 1.8kg payload. The U.S. aviation regulator approved designs for this first flying drone built specially for shipping packages, subsequent to the completion of the 4-year rigorous evaluation that proved the safety and reliability of the M2. After having been operating under Part 135 – FAA's framework for



revenue on-demand air carrier operations – this approval is a key regulatory milestone cleared that enables Matternet to scale up

drone delivery operations in the U.S. and gives the company a strong competitive advantage. This also brings forward the eventuality of delivery drones operating in U.S. cities in the future. We talked with Hans Heerkens, founder and former chairman at Platform Unmanned Cargo Aircraft (PUCA) - a non-profit association of members which aims to support the development and deployment of UCA - about potential forthcoming certification and acceptance of Unmanned Cargo Aircraft (UCA). The UCA are different from mentioned deliver drones that operate in lower airspace (U-space) like the Matternet M2, whereas they operate mainly in the same airspace and under similar conditions as large aircraft. Recently, for "a drone weighing less than 5 kilos made of polystyren"e, Alphabet subsidiary WING said it had to obtain the same certifications as DHL or UPS, which make deliveries by wide-body airliners. May be specific regulation for smaller drones would be more appropriate. Keeping in mind that, according McKinsey figures, the number of drone deliveries increased from 6.000 in 2018 to almost 500000 last year Heerkens gave us global perspectives on what could be the hurdles and expected benefits for UCA in a near future.

In your opinion, will the unmanned cargo transport industry be restricted to the expansion of urban drones or can it easily switch scaled up to a wider scope?

Hans Heerkens: Considering unmanned aviation, people think of drones. But unmanned cargo aircraft, like big planes like the Predator and Global Hawk, are real aircraft. Passenger aircraft fly largely automatically and can even land automatically. With certification, we should not look at just small drones, but build on the expertise that has been accumulated over a century of flight. That is why large enterprises like Airbus and Boeing are so important; they have the experience and expertise to build aircraft that can be used in a dense environment, largely automatically, and at great range (line-of-sight is irrelevant for the drones PUCA is concerned with).

Why regulation clearance seems to move so slow for commercial UAVs/UCA?

I do not think there are 'objective' barriers to get regulation done. It is rather a lack of priority. Everybody is waiting for everyone. I have talked to companies that would be willing to use UCA if they could land them at interesting destinations. Aerospace companies, which I also talked to, would be willing to develop UCA/large drones, if only they could sell them, which they can do if someone could fly them. I also talked to the Dutch Ministry of Traffic and I sense no opposition there, just a lack of sense of urgency. Politicians don't attach priority to UCA, so civil servants don't, either.

Is it a political matter rather than an organizational issue?

Innovations are difficult and often go slowly. It took 20-30 years since the Wright brothers before flight became a practical proposition. It only took 9 years to get from the first manned spaceflight to get to the Moon, but that was because there was political momentum. It shows what political involvement can do. PUCA has people in Brussels who can help wilt regulation but also there it has no priority. I understand that, knowing that I am prejudiced, but we run the chance that we miss an opportunity. Is that so bad? I am sure that we regularly miss opportunities. But we as 'subject matter experts' have the responsibility to make politicians aware that they are missing an opportunity.

Certification and regulation are major hurdles to the deployment of UCA, do you foresee other ones?

Infrastructure is at least as important as regulation. If there is no place to land, it is no use to fly. In many countries, governments play an important role in this respect. They have to allocate landing areas, and often own industrial parks. Unmanned aircraft do not need airports, but can land at short runways (or even on roads closed for traffic during the night) and can make steep approaches (VTOL is, I think, not suitable for long distances) so you can have a greatly increased number of landing grounds, unlocking the economic potential of areas that are at present hard to reach. Some countries could gain a competitive advantage by developing UAVs/UCA and their infrastructure. I would like Europe to set up a 'total' multi-phase program to set up a working infrastructure (regulation, infrastructure, development of the first practical UCA). When UCA are a known quantity, private enterprise can take over, like we are seeing with the exploitation of space (Virgin Galactic). This could be done by setting up a demonstrator program, for example, establishing an UCA route between the harbor of Rotterdam and Eelde Airport (Northeast of Holland) like I am trying to do. The acquired knowledge and experience should then be disseminated to industry, government and the like. You can let unmanned aircraft fly (initially) above the sea or above uninhabited areas. A longer flight time is not a big problem because there are no people on board and you diminish the chances of damage on the ground, and cargo is mostly not as timecritical as passengers).

How would you describe the current UCA competitive environment, and what are its main drivers?

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The BULLETIN One Week in Aerospace & Defense, by ADIT.

The introduction of UCA/large drones can go very fast after a slow start: now only small companies build large drones and flying them in regular service (except General Atomics) but if the first UCA are a success large companies will step in, perhaps taking over small pioneers, and they will have the muscle to get regulation in place quickly. As I said, the knowledge needed for regulation is largely in place, just the practical implementation and political will is needed, and this can be developed hand-in-hand with a demonstrator program like I outlined above. There are already companies developing (larger) unmanned cargo aircraft, like Sabrewing (USA; Ed de Reys) and the Spanish FlyOx. Astral Aviation in Kenya is preparing cargo flights. So: governments should take action so as not to be overtaken by events.

What are the main uses that would result from the introduction of UCA?

A great deal of possible applications: direct connections to industrial parks/more direct flights (everyone can become a shipper), bypassing of hubs, unlocking remote areas with economic potential, independence of human drivers so more scheduling freedom, transporting dangerous goods, routing over sea or uninhabited areas since small detours are not so important, new transport mode giving increased freedom of choice, (small) reduction of road congestion, possibility of electric flight (to gain experience before passengers flights) new configurations possible (like blended wing-body that gives problems with pressurized cabins; for most cargo you don't need pressurized cabins, and you can transport cargo in airtight boxes without the weight, complexity and structural challenges of a pressurization system), lower cost (diverse number of factors), turboprops possible (lower cruise speed required, so utilization of lower-altitude airspace), steep approaches (there need be no consideration for passengers) and no-flare STOL landings, so landings at many more locations possible, fewer scheduling and utilization constraints.

I want to shine a light on the fact that unmanned cargo flight can, no, will, be the precursor of unpiloted passenger flight. I know many people don't want to hear it, but in a number of years we will fly air taxis and regional aircraft unpiloted. And just like with unmanned people movers at airport people will be wary at first, but before long they will not give it any second thought. This is relevant for regulation. Rules should be developed that do not impair unpiloted passenger flights, either because of conflicting regulations or because too many UCA crash, diminishing the support for unpiloted passenger flights. As a side note: I already have a crew for an unpiloted flight across the Atlantic, but I have yet to acquire an aircraft.



PUBLICATION

Space-based solar power: Can it help to decarbonize Europe and make it more energy resilient? (Roland Berger – 2022/08/17)



On Aug. 17, international management consultancy company **Roland Berger** published, in **partnership with German satellite manufacturer OHB System AG**, a cost-benefit study and impact analysis of a space-based solar power (SBSP) **program conducted for the European Space Agency** (ESA) between February and July 2022. The German firm was commissioned by the ESA and its Member States to provide technical and programmatic information regarding the feasibility and potential of SBSP to supply "environmentally sustainable, affordable and clean energy for Europe to meet its growing future energy needs" and achieve carbon neutrality by 2050, in line with the European Commission's European Green Deal initiative which aims to reach similar objectives. For the matter, the ESA in an intergovernmental organisation independent from the EU but the latter contributes to **28.4% of ESA's Budget for 2022 (i.e. €2.03bn)**.

The European agency reckoned that even if solar energy generation has grown far cheaper and more efficient than before, major limitations will always remain as it is subject to weather-related contingencies, day and night alternation and massive sunlight absorption by the atmosphere – Roland Berger recalling that "a considerable fraction of incoming Solar energy (55%-60%) is lost on its way through the Earth's atmosphere due to the effects of reflection and absorption". Because sunlight intensity is ten times as intense at the top of the atmosphere as on earth and up at a certain high orbit it would be available on a continuous basis, the ESA has considered SBSP systems as an attractive alternative energy source and has launched its SOLARIS program, a preparatory technology development and maturation

program to advance key aspects of the concept of SBSP plants. The overarching aim of SOLARIS would be to prepare the ground for a possible European decision in 2025 on a full development program by establishing the technical, political and programmatic viability of this kind of system.

Let's specify what Space-based solar power is: the concept of collecting solar power through a spacecraft in Earth orbit and delivering it to Earth. Three main segments composed an SBSP system: the space segment, the ground segment and the launch segment. The launch segment encompasses heavy reusable launchers (like SpaceX's Falcon 9) or orbital transfer vehicles capable of putting the necessary modules into the desired orbit at low cost. The space segment could be sort of satellite on geostationary orbit (around 35,000km from Earth) equipped with very large solar panels (1.5km in radius) made of multiple twosided tiles assembled together. One side consists of photovoltaic cells, with the other emits power through a precise beam of microwave radiofrequencies. Conversion of sunlight into solar power is completed in between these two sides of the tile. Then, radio frequency waves are sent to rectifying antennas of ground stations (the ground segment) on Earth that would receive these microwaves, transform them into electricity and sustainably integrated into existing power grids. Besides, SBSP could be used for multiple purposes and interests both the military and civilian industries (See The Bulletin #560).



(Credit: European Spatial Agency)

The Roland Berger report, produced by Manfred Hader and Martin Hoyer, two Senior Partners of the German consulting firm, attempted to enlighten the ESA on how the SBSP systems could help Europe to achieve its greenhouse emission goals and identified the hurdles to get over.

On the **feasibility and maturity aspects**, the report underlines that the basic of SBSP technologies "has already been confirmed by multiple studies since 2006". As the ESA formerly assessed, SBSP systems are based on existing technological principles and know physics, no new breakthroughs are required unlike nuclear fusion, for instance. Major concerns are on miniaturization and large modular structures assembly in space. They make reference to the largest human-made structure ever sent to space, the ISS, of which overall envelope is around 8,000m², far smaller than the 15km² needed for an SBSP satellite. Although launch costs have fallen sharply in recent years, it is for now not enough considering the need of costly large launchers such as Ariane 5 and higher launch cadence rate to send all SBSP parts in space. Also, even if most of the technology is known, such a complete wireless infrastructure of 2 million components, in particular for interface between the elements, have never been produce in this form. The analysts assume that only the communication-to-the-ground system is "ready and available", others system elements like Energy conversion system (sunlight to radio frequency) and On-orbit assembly and maintenance (robotic arms to enable robotic operations in space) still require from 10 to 20 years development.

As we can assume, such infrastructure will need huge amount of funds to be designed, manufactured and operated. Regarding this particular aspect, the main cost driver for the SBSP is the space segment. The report bases its cost estimation on the SPS-ALPHA concept from John C. Mankins (former NASA physicist), of which the SBSP system has the capacity of 2GW at a single ground location or 500 MW or less at multiple locations. Full-scale system is expected to have a minimum mass of around 6,000tons. In this framework, the analysts set up two scenarios cumulating the amount of construction of the three segments. The Best case scenario (substantial advances in key technologies and manufacturing approaches) range from €8.1bn to €11bn for first SBSP construction costs and the worst case scenario (based on current approaches and technologies with minimal advances) reaches €33.4bn. But as Roland Berger and OHB mention "there is a significant leap in terms of cost reduction when space hardware adopts industrialized, large-scale mass production. Compared to a single satellite mission, the cost per kg can drop by a factor of 20 for constellation satellites for unit numbers up to 700 satellites". The report also highlights the need for disruptions in critical field like phased array technologies for the energy transmission systems of the architecture, in order to achieve cost competitiveness of SBSP versus other technologies. If it happened, with a price between €50 and nearly €250 per MWh, space solar power could eventually be as competitive as terrestrial nuclear power and more so than fossil fuels.

Hader and Hoyer also focus on how SBSP would help Europe to reach carbon neutrality. Outlining that climate neutrality by 2050 is an uncertain achievement with current technologies, the report features that SBSP system has the potential to generate green electricity

throughout the year with little interruption and without any direct greenhouse gas emissions. Regarding the European countries' plan to phase out coal power plants by 2030 or 2040 for the latecomers and the stagnation of nuclear power plants development, solar power from space can increase the resilience and independence of the energy sector. Specifically SBSP can help Germany to reach its 88% emission reduction target by 2040 by providing renewable baseload capacity and progressively replace coal and gas in its energy mix, or go along with France to complete its nuclear power with renewable baseload capacity.

As SBSP has many challenges to overcome to demonstrate technological and financial viability, the authors set up four different steps to achieve the deployment of space systems: (1) Raise awareness (2022 – 2025); (2) Secure resources to mature the required technologies (2022-2030); (3) Launch a demonstrator to confirm the viability of SBSP (2024-2035); (4) Launch an ambitious and bankable program with public and private partners (2035 onwards). They point out that China, the U.S., the UK, India and Japan have been working on their own program and that the EU must not remain a bystander but has to develop its own proprietary technology.

By the end of November, the European ministers in charge of space will meet. For ESA this is a golden opportunity to obtain funding. The agency wants to convince them of the need to finance a feasibility study, worth about \in 60mn. The private sector also (re)start to express interest on the matter: Siemens Energy joined the ESA's SOLARIS program and Airbus, through its Blue Sky entity, initiates talks with actors from the energy sector.

VALUATION

AIRBUS: Price Target down - BUY (Deutsche Bank - 2022/09/26)

This week, several brokers updated their position on Airbus stock. **Deutsche Bank Aktiengesellschaft** decreased its target price **on from €141.00 to €133.00.** However, the bank stuck to its buy rating for the European aircraft manufacturer. The last time that the institution worked on Airbus' target price it was as well through a downward revaluation from €145.00 to €141.00. The same day, **Jefferies Financial Group** also downgraded the price target of Airbus, from €145.00 to €140.00, but didn't change its recommendation to purchase Airbus stock.

Different factors may explain those slight adjustments. Current **constraints weighing on the aeronautical supply chain**, mostly on spare parts and engines, led Airbus to lower its **delivery target to 700 aircraft for this years – instead of 720** – and reckoned 2023 figure might be under 860 units. The company expects to deliver around 1,000 aircraft in the mid-decade. Last week, Airbus CEO Guillaume Faury reaffirmed its commitment to reach a production of 75 aircraft per month in 2025, a goal considered too ambitious by some of its suppliers like Raytheon Technologies (maker of the Pratt & Whitney engines

powering about half of the Airbus A320s, and many other Collins aerospace systems), which CEO Greg Hayes stated that a rate of 65 units per month in 2025 was "*more reasonable*". Titanium shortage due to sanctions against Russia is still a critical matter for Airbus, as it is an important material for the aeronautical industry, which must seek for new source of supply. Also, newcomers on the narrow-body mediumhaul segment like the Chinese COMAC C919 recently certified by Chinese safety regulation authorities or the Russian Irkut MC-21, threatened to disrupt the balance Airbus and Boeing have maintained on the market, and they may face market share loss.

That being said, Airbus' situation remains solid and the prospects are good. For Citibank's analysts, delays taken by the aircraft manufacturer are not insurmountable and the current share price reflects overly pessimistic expectations in terms of production. They underlined that the market only integrates about 40 deliveries per month, "which is very far" from what they think is the likely outcome. Jefferies outlined that Airbus stock is trading 10% below its 5-year average before COVID-19 and the institution added that the projected €1.2bn of total shareholder returns for 2022 (versus €1.3bn in 2019) attests to Airbus share attraction. And well, the manufacturer backlog of 7,339 aircraft to Aug.31, 2022, enables it to apprehend the future with confidence. For his part, JP Morgan's analyst David Perry continues to recommend a Buy rating on the stock in a research note also published this week, with a TP unchanged at €155. Berenberg Bank, on its side, has gone against the tide and upgraded its Airbus' price target from €140.00 to €150.00. Overall, the consensus price target displayed by MarketBeat reached €143.64. Airbus shares closed Thursday at €88.09, down 2.18%. It has a market value of €67.98bn.

UNLIKELY LINK

SLOVAKIA-SOUTH KOREA: Hanwha and her sisters

On Sept. 21, Korean Minister of National Defense Lee Jong-sup and



Slovakian Minister of Defense Jaroslav Nad' signed a MoU defense cooperation on following the attendance of the Slovak representative at DX 2022, Korea an ongoing biennial international defense exhibition in Goyang, northwest of Seoul. Both

defense chiefs agreed to expand their collaboration to cover new areas, such as cybersecurity and climate change, and to seek the signing of a separate bilateral MoU on logistics and arms industry cooperation. This meeting also provided the opportunity for Bratislava to reassert its support to Republic of Korea's (ROK) initiative for complete "denuclearization and prosperity on the Korean Peninsula". The military

cyber defence capabilities that the ROK has developed to forearm itself against its warlike northern neighbour, especially the development of relevant skills to prevent and protect the country's critical infrastructure from cyberattacks, arouse interest of the Slovaks.

Relations between South Korea and the Slovak Republic are mostly economic. The ROK remains by far Bratislava's largest investor among non-EU countries, and is one of the tenth largest investors in Slovakia just after countries like Germany, Netherlands, Austria or the Czech Republic. In 2016, South Korean foreign direct investment (FDI) stocks in Slovakia amounted to €2.9bn over a total of €47.59bn. Nonetheless, military cooperation between the two doesn't come out of nowhere: last fall, Korea Aerospace Industries (KAI) and Slovakia's state-run defense firm Letecké opravovne Trenčín (LOTN) signed an agreement on cooperation in the export of 10 KAI's F/A-50 "Golden Eagle" fighter jets to Slovakia - which can be used for both training and light attack - in the context of a summit in Budapest between the Visegrad Group (Hungary, Slovakia, Czech Republic and Poland) and the ROK. Through this potential \$500mn sale the Slovak Air Force seeks to replace its ageing Aero L-39 Albatros training jet fleet. But since last November there has been no progress on the matter and Nad"s official visit was an opportunity to revive the issue, especially since the delivery of 14 F-16 Block 70/72 which Bratislava ordered from Lockheed Martin in 2018 has been delayed in March by 12-14 months due to global chip shortage. It is in that context that the large Slovak delegation of around 30 members attempted to Defense Expo Korea 2022 and visited the factories of South Korean companies like Hyundai Rotem and KAI. Recently, Bratislava has shown interest in the acquisition of several K2 "Black Panther" battle tanks, also manufactured by KAI, and some K9 Thunder 155 mm self-propelled howitzers manufactured by Hanwha Defense, as part of its armed forces modernization program until 2035.

In recent years, South Korean charm offensives towards the Visegrad Group, or more broadly Eastern Europe, has increased. During the second summit of Prime Ministers of the Visegrad Group and the President of the ROK, the ninth point of the joint statement mentioned that all parties "agreed that the possibility of furthering cooperation in the areas of national defence and defence industry should be explored". In this matter, Seoul put the good quality of its military technology as well as its expertise with NATO standards on show in order to seduce European actors for their future acquisitions. The Russian aggression towards Ukraine worked as catalyst, like Chun In-bum, a retired South Korean general, told to Asia Times: "We had the expertise, we had the experience, we had the good products," he said. "Then Russia started a war". And that produced immediate results, as Poland has recently placed an order to both KAI and Hanwha Defense for 48 F/A-50 and F/A-50PL, 1,000 K-2PL "Black Panther" and 648 K9A1 "Thunder" howitzers. The cumulated amount of all those deals could reach \$15bn or more. Furthermore, during last week Def Expo Korea, Lee Jong-sup met with his Romanian counterpart too, Minister Vasile Dîncu, to talk about Bucharest military needs, and we can figure out it was also about tanks and howitzers.

AT-A-GLANCE

CIVIL AVIATION

- CANADA: WestJet has ordered 42 Boeing 737 MAX 10 with options in place for 22 more that, if exercised, would bring the carrier's future Max fleet to 105. "WestJet CEO Alexis von Hoensbroech noted that the first deliveries of the order would take place in late 2024, with all aircraft expected to be received by 2028. Since this transaction is in addition to an existing order for 23 aircraft, WestJet's fleet will welcome a total of 65 new aircraft in the next six years.
- USA: according to a Sept. 19 letter seen by Reuters as well as the Seattle Times, the Federal Aviation Administration (FAA) told Boeing it has not completed work needed in order to certify the 737 MAX 7 by December, a deadline previously set to win approval from the FAA of the 737 MAX 7 and 10 variants, or it must meet new modern cockpit-alerting requirements.
- USA: American Airlines Group and JetBlue Airways will defend their "Northeast Alliance" partnership in a trial starting this week against government allegations that their association will bring higher fares. The partnership was announced in 2020 and was approved by the Trump administration. JetBlue is currently on the midst of another deal, as the airline proposed \$3.8bn to acquire Spirit Airlines.
- BRAZIL: Boeing announced that it has delivered its 100th contracted 737-800 Boeing Converted Freighter (BFC) to AerCap Cargo, who will lease it to GOL Linhas Aéreas. Customer of Boeing 737-800BCF since 2016, Aercap has currently 65 firm orders and 9 options for such aircraft.
- JAPAN: Japanese airline Toki Air and French ATR have signed a 10-year global maintenance contract for Toki Air's 2 leased ATR72-600 aircraft, which are set to begin operations in 2023. This includes on-site stock, line replaceable unit pool exchange and repair service, as well as propeller blade and leading gears.
- TAIWAN: China Airlines has finalized an order for 16 Boeing 787 Dreamliner Jets (\$4.6bn at list prices) plus an option for 8 more. From now, Taiwanese airline has 22 Boeing aircraft on order, including six 777 freighters. China Airlines plans to use the 787-9s to replace its aging Airbus A350 wide-body aircraft.
- CHINA: French Safran Nacelles has signed an agreement to support the nacelles of Spring Airlines' Airbus A320neo aircraft, which are equipped with CFM International LEAP-1A engines. Safran Nacelles will provide support at its facility in Suzhou, China.
- CHINA: On September 29, Civil Aviation Administration of China has certified the COMAC narrow-body C919 aircraft, China's home-grown passenger jet to compete with the Airbus A320 and Boeing 737 family of aircraft. The C919's launch customer is China Eastern Airlines which has announced it expects to take delivery of

one jet in 2022 and a further four in 2023. As a reminder, the list sales price of the C919 was revealed to be \pm 653mn (\pm 101mn), which is getting very close to the list prices of Boeing and Airbus alternatives.

- CHINA: Cathay Pacific Airways is in talks with both Airbus and Boeing about buying next-generation freighter aircraft, as it seeks to renew and replace some of its cargo jets. Cathay, one of the world's largest cargo airline by capacity, could buy as many as 6 new freighters, some sources said.
- MALAYSIA: Malaysia Airlines Bhd, an airline unit of Malaysia Aviation Group (MAG), is planning to return all six of its Airbus A380 to Airbus by 2023, according to a report by the New Straits Times
- INDIA: After having placed certain pilots on leave without pay for a period of 3 months, SpiceJet has announced a 20% salary hike for its captains and senior first officers from October as it gets the first tranche of funds under the government's credit guarantee scheme.
- INDIA: Air India (Tata Group) and Tata SIA Airlines Ltd (a joint-venture between Tata Sons and Singapore Airlines which operates Vistara) may merge under a new joint venture. If confirmed, Singapore Airlines could own a 25% stake worth between \$614mn and \$1.2bn in the new company. The merger may take about a year to complete and aims to gain a larger market share to take on IndiGo, India's biggest airline with a market share of 59%.
- IRAN: The U.S. Commerce Department said on Monday it had added a fourth Iranian cargo plane serving Russia to a list of aircraft believed to violate U.S. export controls under Biden administration sanctions. The fourth plane belongs to Iran's Saha Airlines, which is owned by Iran's Air Force.
- UAE: Etihad Cargo became the first Middle Eastern carrier to participate in The International Air Cargo Association's (TIACA) Blue Sky program. The program encompasses evidence-based desktop verification process for participant to assess progression on 8 critical sustainability criteria like decarbonisation, waste elimination, biodiversity protection or efficiency and profitability, among others.
- TURKEY: Turkish Airlines has extended its cancellation of flights to and from Belarus and Russia until at least 2023. The airlines already lengthened the cancellation of flights once by declaring that it would not be operating flights to both countries until September 30, 2022.
- RUSSIA: State-owned defense conglomerate Rostec wants to go it alone without the West and to produce 1,000 aircraft by 2030 using locally built parts. Rostec includes Russia's only manufacturer of civil aircraft and was used to rely on Boeing and Airbus, both accounting for 95% of passenger traffic in the country.
- EUROPE: In the framework of the A321XLR program, the second of the three test aircraft that will participate in the certification

program for Airbus' long-haul single-aisle aircraft made its maiden flight on September 23 from Finkenwerder, Hamburg. The third A321XLR test aircraft will have lighter test instrumentation, focusing on cabin interior maturity work and the route proving campaign. The A321XLR is scheduled to enter service in 2024.

- UK/QATAR: British Airways and Qatar Airways have announced the expansion of their partnership, adding 42 new countries to their shared network, including Italy, Norway, Singapore, Sweden and the Maldives. The expansion also includes shared loyalty programs. Total number of destinations served by the two reached 185.
- UK: EasyJet may become one of first companies to drop its carbon offsetting scheme. The low-cost airline will instead focus on investing in new technologies to cut emissions as it stops paying to offset all carbon from its flights by the end of this year.
- ► UK: Rolls-Royce will be a partner and coordinator of three research and innovation programs, HEAVEN, HE-ART and CAVENDISH, aim at accelerating research on sustainable propulsion and decarbonisation. These programs will be funded by the European Union, through Clean Aviation, which will provide more than €700mn in funding for a total of 20 research and innovation programs in the aeronautics sector.
- FRANCE: Boeing France has announced that Mecadaq Group, a French company specialized in the manufacture and assembly of high-precision machining parts for the world's leading aircraft manufacturers, has joined the Boeing French Team as the 18th member. Mecadaq is the first member to join the French Team since 2018.
- FRANCE: On Thursday, September 29, an interprofessional strike occurred at the Airbus plan in Toulouse, France. It followed a call for employee mobilization launched by the CGT Airbus, to highlight their wage problems due to ragging inflation that hit +5.3% over the last 8 months.
- FRANCE: Ascendances Flight Technologies hired François Caudron, former marketing director at Airbus for the past 20 years. Caudron will go along with the Toulouse-based company as a Special Advisor Business in the marketing of its hybrid vertical takeoff and landing aircraft, as well as its hybrid engine.

BUSINESS AVIATION

- WORLD: According to a report by Jefferies Equity Research, the inventory of preowned business jet is down 27% year-on-year. As of September 2022, only 2.7% of the in-service fleet is on the market. Taken alone, large-cabin jets are down 34% since last September.
- WORLD: Business aviation groups have released a policy principles document to guide, meant to support the 2009 Business

Aviation Commitment on Climate Change initiative, through which the industry committed to achieving net-zero CO2 emissions by 2050. The four guiding principles outlined in the document are: increased investments in SAF production; a greater use of industry initiatives such as SAF book-and-claim; greater support to innovations such as electric-powered aircraft; and further cooperative programs aiming to increase aviation sustainability.

- USA: The all-electric airplane manufacturer Eviation has successfully completed the first-ever flight of its Alice electric aircraft. The experimental jet flew for close to nine minutes, achieving an important and hitherto unseen milestone in the race for the development of electric business aircraft.
- USA: Gulfstream has announced the delivery of its 500th G650 ultra-long-range business jet, to an undisclosed customer. The same week, the Maltese air operator Flexjet has taken delivery of its first Gulfstream G650; it now expects to receive another G650 within the next six months.
- USA: Textron Aviation and ZeroAvia are jointly developing a hydrogen-electric powertrain for the Cessna Grand Caravan to create a zero-emission aircraft. The plan is to retrofit the Grand Caravan with ZeroAvia's ZA600 zero-emission powertrain..
- USA: BAE Systems has announced the delivery of the last set of key components for the US Air Force's first EC-37B Compass Call aircraft. This jet, which is a military variant of the Gulfstream G550 business jet, is designed to carry out electronic warfare missions. L3Harris is the platform integrator for this program.
- MALAYSIA: The local branch of Dassault Aviation's subsidiary ExecuJet MRO Services, which had recently started the construction of a new MRO facility at Subang Airport in Kuala Lampur, has announced that the existing facility is set to add zincnickel and cadmium electroplating technology to its in-house capabilities. This development, according to the firm's regional VP, will provide "better control over the workflow for airframe heavy maintenance checks and ultimately provide better turnaround times."
- AUSTRALIA: The Canadian aircraft manufacturer Bombardier has inaugurated its new 50,000-sq-ft Melbourne service center at Essendon Fields Airport, increasing its footprint in the Asia-Pacific. With 80 in-service aircraft, Bombardier jets represent 31% of the business fleet in Australia (a figure reaching 47% of midsize and large business jets).
- SWEDEN: The Swedish electric aircraft start-up Heart Aerospace has selected the Canadian MSB (a subsidiary of the French aerospace engineering company Sogeclair) to create around 60 structural components for the cabin, flight deck, and cargo sections of its ES-30 electric regional jet.
- FRANCE: Safran Electrical & Power has opened a new 69,000-sq-ft electrical engineering center of excellence in Créteil, a city located

SPEAKERS' CORNER

"If the territorial integrity of our country is threatened, we will without doubt use all available means to protect Russia and our people - this is not a bluff": Russian President Vladimir Putin said in a televised address to the nation last week, before today's annexation of a chunk of Ukraine. (*Reuters* — 2022/09/21)

"Britain sells, France sells them, Russia sells them. It is possible to obtain them from everywhere", said Turkish President **Recep Tayyip Erdoğan**, hinting that he could negotiate fighter jets with other countries in case the United States refuse to sell F-16 (*JANES – 2022/09/27*)

"The trend is toward more electrification of onboard power for reliability and overall optimization, with strong weight and cost considerations" said **Stéphane** Cueille, president of Safran Electrical and Power regarding future evolution or airplane propulsion (*AFP* - 2022/09/23)

"Faury might say rate 75, but we think rate 65 is doable by 2025" Gregory J. Hayes, head of Raytheon Technologies, owner of engine maker Pratt & Whitney, told a conference last week regarding the industrial ramp up required by the European aircraft manufacturer (*Morgan Stanley – 2022/09/22*)

"Really unhelpful" this is how Airbus CEO **Guillaume Faury** characterized Hayne's skeptical comments made last week, and committing again to his 2025 target of 75 ac/month (*AFP - 2022/09/23*)

215%: such is the cost growth of the US Army-led IAMD Battle Command Systems (IBCS) above the original 2009 estimate of \$1.6bn, after the service committed to a total I start-up funding for the project to \$5.1bn (*Inside the Army* — 2022/09/26)

50 by 2025: such would be – in Billions of Euros - the amount of the French Defense budget in 3 years according to Armed Forces Minister Sebastien Lecornu (*AFP* — *2022/09/28*)

2.5% by 2026 and 3% by 2030: such would be the proportion of British GDP allocated to defense according to UK Minister for Defence Ben Wallace (*Sunday Telegraph — 2022/09/26*)

500: such is the number of Gulfstream G650 and G650ER ultra-long range business jets delivered to date. (*Gulfstream Aerospace Corp.*—2022/09/26)

416bn: such is the new total cost of the F-35/JSF program as estimated the related Selected Acquisition Report for fiscal year 2021, higher than the previous 400bn (DoD - 2022/09/23)

18: such is the number of High-Mobility Artillery Rocket Systems (HIMARS) the Pentagon intends to donate Kyiv as part of its latest support package (*DoD* — 2022/09/23)

7%: such is the expected average annual growth of the Indian aviation sector over 20 years period (*Boeing Forecast — 2022/09/02*)

near Paris, aiming to reunite its aircraft electrical and power design and engineering expertise in one single place. Speaking at the opening celebration, the Electrical & Power branch CEO Stéphane Cueille said that Safran was eyeing 2023 for the first test flight of its electric engine ENGINeUS 50, powering an EcoPulse airplane, jointly developed by Airbus and Daher.

FRANCE: Dassault Aviation has inaugurated the 13,000-mt-sq extension of its historic factory based in Seclin, Northern France. This factory, which size now reaches 50,000-mt-sq, is notably the main production site of the Rafale and Falcon jets. Speaking at the opening ceremony, Dassault Aviation CEO Eric Trappier announced plans to take the existing 600-people workforce to 700 by 2025.

MILITARY AVIATION

- USA: After supplier issues and schedule delays, the Navy announced itsMQ-25 Stingray program has moved beyond its setbacks -- but remains on a tight schedule to achieve operational capability by 2025. The service is looking to Boeing's MQ-25 unmanned aircraft to play a major role in the future carrier air wing, providing aerial refueling for the fleet and alleviating some of the pressure on F/A-18 Super Hornets.
- USA: Boeing's St Louis' facilities were awarded a \$191.7mn. ceiling-priced, delivery order under a previously awarded basic ordering agreement for the repair of multiple flight control surfaces used on the F/A-18E/F and E/A-18G aircrafts.
- USA: As per reported by Defense News, it was revealed that a new batch of companies, including a division of Germany's Siemens, are entering a Department of Defense competition meant to bring to fruition a vision of seamless military communications as part of a deal worth up to \$950mn. A contract announcement said the players would be tasked with maturation, demonstration and proliferation "of capabilities across platforms and domains, leveraging open systems design, modern software and algorithm development in order to enable" JADC2 (Joint All-Domain Command and Control). Work is anticipated to conclude in May 2025.
- USA: Naval Air Systems Command (NAVAIR) has issued a \$769.87mn. contract modification to Raytheon Technologies and Pratt & Whitney Military Engines in support of F135 engine requirements for the USAF, USMC, USN, FMS customers and 'non-Department of Defense participants', the DoD announced on September 23rd.
- USA: America's Chinese "frenemies" are "not having a debate over the relevance of six-gen air dominance - and I can also tell you

they're ontrack," said Air Combat Command head Gen. Mark Kelly in an effort to stimulate a transition towards new air platforms in order to maintain air superiority in the event of a major power conflict. As hinted by Kelly, China is indeed at work on a sixthgeneration fighter jet, meant to replace the current J-20 model,

- PHILIPPINES: The vice commander of the Philippine Air Force (PAF) Maj. Gen. Arthur Cordura told senators during a hearing that only five out of twelve FA-50PH fighters are currently operational. He further explained that two jets are undergoing routine maintenance while the rest are meanwhile waiting for spare parts. Delivery of spares are delayed by the COVID pandemic He added that 10 jets will be serviceable by the end of the year.
- INDIA: The Indian Air Force (IAF) plans to lease airborne early warning aircraft in order to address oncoming capability gaps. The leased aircraft are to be used until the IAF gets new planes from its own indigenous sources. A source speaking to India Today said the IAF might try to lease these planes from global manufacturers "if someone is willing to", as only a few countries can produce such systems. The service currently operates five airborne warning aircraft, three Israeli-origin Phalcon airborne early warning and control systems and two homegrown Netra AEW&C planes.
- KUWAIT: Raytheon Technologies Corp announced a contract involving depot-level repair capability for the government of Kuwait's inventory of AN/APG-79 AESA radar weapon replaceable assemblies. Valued at \$15.3mn., the contract is expected to be completed by February 2023.
- UAE: Reuters reported that Israel has approved a UAE request in the middle of the summer to supply the Gulf state with Rafaelmade SPYDER mobile interceptors. Information came from two sources declining to provide further details due to the sensitive nature of the deal.
- SOUTH AFRICA: South African company Paramount Group declared that it had sold nine short-takeoff-and-landing Mwari aircraft to "multiple air forces" during the Africa Aerospace and Defence Expo. According to company spokesman Sam Amsterdam, the Mwari "integrates design concepts from helicopters, surveillance platforms and reconnaissance aircraft with the ability to carry multiple systems, such as surveillance radar and electro optic sensor systems."
- FINLAND: The Valmet L-70 Vinka elementary school aircraft will retire from the Finnish Air Force on September 1, after more than 40 years of service. Designed and built in Finland, the piston engine Vinka was developed in the 1970s as a replacement for the Swedish-made Saab Safir as an elementary school machine. The Grob G 115E will now replace the Vinka as the Air Force's primary school plane, of which a total of 28 have been purchased.

- GERMANY: As revealed by local media BILD, the F-35 contract is to be signed "this year", and the contract for the procurement of the Chinook in the "first few months of 2023". The F-35s will replace the Tornados that the Air Force has flown since the early 1980s. The Chinook helicopter will itself replace the aging CH-53 fleet. The money earmarked for the contract womm come from Germany's new defense special fund. As reminded by BILD, a total of almost 41 of the fund's €100bn. are reserved for aerial equipment.
- SPAIN: The local Ministry of Defense has contracted the national companies belonging to the Future Combat Air System (NGWS/FCAS) program to collaborate in the development of the Concept of Operations (CONOPS), investigating possible evolutions of the challenges of the National Defense, in the domain of responsibility of the Air Force, and detailing possible solutions to face them. Spain roughly the same amount than France and Germany for this phase of the contract, (€2,5bn. until 2027). Research carried out during this phasewill allow the resulting Concept of Operations to help define the FCAS program in its next stages of technology maturation and demonstrator development.

HELICOPTERS

- USA: On Monday, the US Army conducted deck landings with CH-47F Chinook helicopters on the U.S. Navy's only forward-deployed aircraft carrier, USS Ronald Reagan (CVN 76), in the East Sea.
- USA: Boeing won a \$16.4 million contract modification external link to Foreign Military Sales (Saudi Arabia and United Kingdom) for improved drive system-enhancement on the Apache attack helicopter, production line and for the Apache Longbow crew trainers. Work will take place in Arizona. The estimated completion date is August 30, 2024.
- USA: Moog is awarded an \$8,611,797 firm-fixed-price contract for the spare of the Planetary Blade Fol used on the Bell Boeing V-22 Osprey. All work will be performed in Torrance, California, and is expected to be completed by March 2026.
- SINGAPORE: On Tuesday, a Bell 50, fueled with Neste MY Sustainable Aviation Fuel (SAF) took off at Seletar Airport in Singapore for a demonstration flight. This is the first ever helicopter flight fueled with SAF in Southeast Asia.
- INDIA: Embraer spinoff Eve Holding and on-demand helicopter service provider Blade India announced a strategic partnership including a non-binding order of up to 200 eVTOL. Along with the aircraft, the agreement covers urban air traffic management software. The companies also plan to collaborate on a three-month project flying passengers using helicopters.
- CROATIA: Bell announced a signed purchase agreement for 2 SUBARU Bell 412EPX helicopters to the Republic of Croatia's

MEANWHILE

Not in my backyard !

General Atomics Aeronautical Systems (GA-ASI) is currently engaged in a fight to oppose a new Chinese agricultural investment near Grand Forks Air Force Base, (North Dakota). The project is indeed planning to develop a large-scale corn milling plant on 370 acres barely 15 miles from the air base. Among other defence majors, GA-ASI uses local airspace at Grand Forks to conduct key strategic test and evaluation efforts related to unmanned aircraft, radar systems, and other advanced military technologies. To that extent, the US defence giant fears that this initiative might be directly connected to Beijing's efforts to steal technologies from its peer competitors. According to GA-ASI spokesman C. Mark Brinkley, the "scale and scope" of the plan offers huge opportunities in terms of modern espionage. It is indeed not too hard to imagine how 370 acres of land could be used to conceal data-spoofing devices, spy-drones and other tapping systems. It remains to be seen whether the US Committee on Foreign Investment, in charge of the matter, will grant GA-ASI's request. As admitted by Brinkley himself, the project represents "significant economic opportunities" for the state of North Dakota.

Light my fire (French and US remix)

Submarines, despite their tendency to stay underwater, are not immune to fire, yet his rather basic truth is still hard to understand for some apparently. La Perle, one of the six French nuclear attack submarines, which had been already ravaged by a spectacular fire in June 2020 while undergoing maintenance in Toulon, was reported to have caught fire once again this Monday... This time, the mishap was caused "insulating materials [detected] at the level of a room intended for food storage" the spokesman of the maritime prefecture, Pierre-Louis Josselin, told the press. A hundred firefighters then tackled these "combustion without flames", using water to lower the temperature, he added. Despite of the worrying emergency that it caused, the fire reportedly did not generate any radioactive risk as the reactor was shut down. Let's just hope the brain of maintenance engineers does not shut down as well during the next repair works...

Meanwhile in the US, the trial of the suspected arsonist who put fire to the USS Bonhomme Richard (LHD-6) on July 12, 2020, totally destroying the amphibious assault ship that was just about to to accommodate the F-35B Lightning II after a \$249mn modernization program. Based on the criminal investigation conducted by Naval Criminal Investigative Service and the U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives ruled out any accidental ignition, and identified Seaman recruit Ryan Sawyer Mays as the likely suspect. Navy officials ultimately decided not to repair the ship – an estimated \$3bn loss – and sold it for scrap. The case is expected to wrap up by the week's end, according to a report of the U.S. Naval Institute. Ministry of Interior. This marks the first purchase agreement for SUBARU Bell 412 EPXs in Europe. The expected delivery date of the aircraft is October 2023.

- ITALY: Last week, Alberto Pietra, Leonardo's senior vice president for Asia and Far East regional markets, said during an interview with The Korea Times that "Korea is one of the top partner and the top markets" of Leonardo Helicopters. The Republic of Korea Navy has operated the AW159 while the Coast Guard, firefighting services and medical operators are also its faithful customers.
- FRANCE: Few weeks after six European NATO nations embarked on efforts to define future transport needs under the alliance's Next Generation Rotorcraft Capability (NGRC) project, the head of Airbus Helicopters, Bruno Even, urged Europe to back its domestic defence industry when launching major new military programme.
- UK: Vertical Aerospace achieved a first tethered takeoff with its VX4 eVTOL prototype aircraft. This was the fourth stage of Vertical's six-stage flight test program and will be followed soon by lowspeed flight at 15m

UNMANNED AERIAL SYSTEMS

- USA:
- USA: FAA released new design guidelines for vertiports to provide key information for airport owners, operators and developers and help them develop facilities able to support AAM operations. "These vertiport design standards provide the foundation needed to begin safely building infrastructure in this new era" said Associate Administrator for Airports Shannetta Griffin, P.E.
- USA: Pioneering AAM company Kitty Hawk has announced on Sep. 21 it is ceasing operations, which will result in the layoff of 100 employees. Backed by Google's Larry Page, the air taxi company has not offered details about its closure. The statement led Wisk Aero to declare that it was not impacted and that it "remains in a strong financial position, with both Boeing and KittyHawk as investors."
- USA: AeroVironment is to supply the U.S. Army with an undisclosed amount of extra Switchblade 300 loitering munitions under a new \$20.6mn contract. The firm-fixed-price deal was awarded in mid-August but it was only publicly acknowledged on Sep. 22. The small "suicide" drones are scheduled to be delivered by Jul. 2023.
- USA: Florida-based Undefined Technologies has announced that its Silent Ventus ion propulsion eVTOL drone has cleared an essential test flight. The aircraft met its projected flight time and lifting power, and showcased its flight performance during a 4.5min flight, with noise levels under 75dB. By the end of 2023, Undefined Technologies intends to reach 15min flight times with sub-70dB noise levels.

- THAILAND: The Royal Thai Navy has placed an order for Hermes900 maritime unmanned aerial vehicles (UAVs) from Israel. In a statement on 28 September, Elbit Systems Ltd cited the value of the contract at THB4.6bn (\$120mn). The company added that the medium-altitude long-range (MALE) UAVs will
- INDIA: FlyBlade India, a JV between Hunch Ventures and Blade Air Mobility, and Eve Air Mobility announced on Sep. 27 a strategic partnership which includes a non-binding order of up to 200 eVTOL Dvehicles, service and support, and Eve's Urban UATM software solution. The companies also plan to collaborate on a 3month pilot project connecting passengers using helicopters.
- INDIA: GA-ASI announced partnerships with AI Company 114ai and semiconductor startup 3rdiTech as part of the company's "Make in India" roadmap. "We are looking forward to increased cooperation on NextGen AI technologies that we have been working on with the team at 114ai for the last few months", said Dr. Vivek Lall, CEO of General Atomics Global Corporation, "GA-ASI will work with 3rdiTech to transition this cutting-edge capability [semiconductors] onto some of India's platforms."
- SOUTH AFRICA: Hensoldt South Africa officially launched a production-ready model of its ASTUS tactical UAS at the Africa Aerospace & Defence 2022 expo in Pretoria on Sep. 21-25. ASTUS, developed from 2017 by Tellumat, has been fitted with the ARGOS-8 lightweight airborne surveillance and targeting system, which itself was launched at the AAD 2022 expo.
- TURKEY: Foreign minister Mevlut Cavusoglu said on Sep. 26 during a press conference in Tokyo that Malaysia and Indonesia "show great interest in our defense industry products", mentioning armed drones from Baykar, and that "agreements are being signed". "We would most gladly meet Japan's need for drones," the minister added.
- RUSSIA: James Rogers, assistant professor in war studies at the Danish Institute for Advanced Study, told Shephard Media that the acquisition of Iranian UAVs by Russia is "clearly motivated" by Moscow's weapons supply issues and depletion of arms. "Iranian military drones have been known to be inconsistent in performance," added Rogers. "However, the Shahed 129 is a battle-tested MALE UAV that may prove useful to Russian forces when looking to strike US-provided HIMARS in Ukraine."
- NORWAY: On Sep. 26, the Petroleum Safety Authority called on Norwegian oil and gas operators to be vigilant following sightings of unidentified drones in the vicinity of platforms on the Norwegian Continental Shelf. Equinor representative confirmed that a drone was seen just 50m from the Heidrun platform. The South Norwegian Police directorate is investigating the incidents.
- FRANCE: M3 Systems, Pipistrel, and Volocopter have completed their 1st joint flight test campaign at Pontoise airfield. The weeklong flight tests simulated 3 different avoidance maneuvers. This campaign, with its French partners Groupe ADP and its subsidiary

Hologarde, aimed to achieve smooth interaction within and between the new lower airspace's UTM and standard civil aviation ATM systems.

- EU: On Sep. 28, the European Commission proposed the Al Liability Directive, a set of rules making it easier for individuals and companies to sue makers of drones, robots and other products equipped with artificial intelligence software for compensation for harm caused by them..
- SPAIN: The Council of the Xunta gave the go-ahead yesterday to ь the signing of two agreements with the companies Airbus, Babcock and Telespazio, which will be the "first three strategic partners" of the aerospace pole of Galicia, located in Rozas (Lugo), CE Noticias Financieras reports. According to the regional president, Alfonso Rueda, this is a "public-private alliance" with these three companies "of recognized international trajectory" that will mobilize a total of 283 million euros with the forecast of creating 400 jobs until 2026.

LAND & GROUND-BASED SYSTEMS

- USA: The US Army's Contracting Command ordered 54 Precision Strike Missiles (PrSMs) from Lockheed Martin Missiles and Fire Control for \$77.42mn.
- USA: Oshkosh Defense won a \$260mn contract to provide the Army with an enhanced heavy transport trailer capable of hauling Abrams tanks, which have grown increasingly heavy in recent years as they have been upgraded.
- USA: Sole bidder L3Harris Technologies has received a ten-year contract worth \$886mn from the US Army to sustain the Common Data Link (CDL) secure communications programme.
- BRAZIL: The Brazilian Army has released new requirements for the modernization of part of its Leopard 1A5 BR fleet under the VBC CC Corrente programme to maintain them in service until 2037, according to Shepard.
- BRAZIL: Empresa Brasileira de Aeronáutica S.A (Embraer) has delivered to the Army the first two units of the SABER M60 radars, version 2.0, which will be used by the Brazilian Army's anti-aircraft artillery unit.
- INDIA: Saab announced its plan to set up a manufacturing facility in India for the Carl-Gustaf M4 shoulder-fired weapon system under the Union government's Make in India initiative to bolster indigenous defence manufacturing, a company official said. Production at the new facility is expected to begin in 2024.
- KUWAIT: General Dynamics will provide ammunition for M1A2K MBTs operated by the Kuwait Army, under a future FMS deal worth an estimated \$250mn.

- IRAQ: Iraq has received another GM403 Groundmaster-series ground-based air defence radar from Thales, as said by the Iraqi MoD on 26 September.
- UKRAINE: On 28 September, the US DoD announced an additional \$1.1bn security assistance for Ukraine, including supplying 18 more High Mobility Artillery Rocket Systems (HIMARS) and associated ammunition, a further 150 HMMWVs, 150 tactical vehicles for towing weapons, 40 trucks and 80 trailers for logistics, 20 multi-mission radars and undisclosed number of counter-UAS systems.
- NETHERLANDS: The first of up to 141 upgraded CV9035NL IFVs (Infantry Fighting Vehicles) destined to the Royal Netherlands Army has rolled off the BAE Systems Hägglunds production line in Sweden. A total of 122 vehicles are undergoing an MLU (including an improved protection and better ergonomics) with an option for 19 more under a \$500mn contract signed in January 2021.
- UK: Israel's Rafael Advanced Defense Systems has acquired British ground vehicle equipment provider Pearson Engineering (known for its mine plough systems), the buyer announced on 28 September

NAVAL SYSTEMS

- USA: The Government Accountability Office strongly criticizes the US Navy over the Orca XLUUV program in a recent report, noting that the project, entrusted to Boeing, is facing at least 3 years of delays and has exceeded its initial budget (\$379m) by \$242m. The GAO blames the cost overruns on the "Navy's decision to not require the contractor to demonstrate its readiness to fabricate the prototype XLUUVs, as called for by leading acquisition practices".
- COLOMBIA: The Colombian MoD announced on Sept. 22 the selection of Damen and its frigate design SIMGA 10514 for the Colombian Navy's PES program, which provides for building locally, through COTECMAR, 5 frigates.
- AUSTRALIA: The Wall Street Journal unveils that the Biden Administration is considering, within the AUKUS partnership, expanding the US nuclear submarine production capability to be able to build Australia's first Virginia-class SSNs and deliver them by 2035, thus allowing to speed up the project and avoid a potential capability gap for the Royal Australian Navy. Canberra would be asked to finance a part of the necessary investments in the US shipyards, which would be valued billions of USD. After the delivery of the first SSNs to Australia, US shipbuilders would then assist Australia's Osborne Shipyard in building locally the remaining submarines.
- AUSTRALIA: ECA Group has formed a partnership with UGL, a subsidiary of CIMIC Group, in order to expand its footprint on the Australian market. ECA and its partners are competing against a

consortium formed by Saab Australia, Leidos Australia, SeeByte and Sonartech Atlas for the Royal Australian Navy's SEA 1905 Tranche 1 – Maritime Mine Countermeasures Survey program.

- INDONESIA: PT PAL's Production Director, Iqbal Fikri, stated on Sept. 22 during a seminar held in Surabaya that the Indonesian state-owned shipbuilder should continue its plans to develop its industrial capabilities regarding the national production of submarines. He also revealed that PT PAL is currently working on an Unmanned Underwater Vehicle concept, with the aim to produce a first prototype in the next 3 years.
- SOUTH KOREA: Naval News reports that Thales pitched its SonoFlash new generation sonobuoy to the South Korean Navy during the DX 2022 show.
- SOUTH KOREA: DSME and Hanwha announced on Sept. 26 the signature of a conditional investment agreement paving the way for Hanwha to acquire a 49.3% stake in DSME for \$1.4bn, and assume operational control over the South-Korean shipbuilder. DSME however stressed out that a formal competition will be held to sort out the bids of potential investors.
- MALAYSIA: The Malaysian Navy has asked \$524,84m under next year's budget to procure the initial batch of 3 Littoral Mission Ships Second Batch. The service intends to acquire 8 OPVs with improved capabilities (compared to the First Batch of the program).
- INDIA: Hindustan Shipyard launched on Sept. 22 two Diving Support Vessels for the Indian Navy: the future INS Nistar and INS Nipun. The two ships were indigenously designed.
- ISRAEL: The Israeli Navy confirmed on Sept. 21 it successfully tested last August IAI's new long-range anti-ship missile, the Gabriel V, from the Sa'ar 6-class corvette INS Oz.
- FINLAND: Shephard reports that the Finnish MoD has admitted additional delays in its Squadron 2020 corvette program, which plans to build locally 4 Pohjanmaa-class vessels for the Finnish Navy. Construction of the 1st vessel by Rauma Marine Constructions is now expected to begin in mid-2023 (compared to 2018 initially).
- ITALY: An Italian court has cancelled the lay-off procedure initiated by Wärtsilä to dismiss 451 employees at its Trieste plant, Italy.
- GERMANY: The Bundestag's Budget Committee has greenlighted the acquisition of 600 RAM Block 2B surface-to-air missiles developed by a joint-venture between Raytheon and Diehl Defense, for the German Navy's surface fleet.
- DENMARK: Shephard reports that, as the Royal Danish Navy is set to receive in Oct. 2022 its 6th and last modular Light Autonomous Underwater Vehicle from Portugal's OceanScan-Marine Systems and Technology, the service is considering acquiring other UUVs to boost its capabilities regarding mine counter measures.

- FRANCE: Naval Group and French New Space startup Prométhée have formed a partnership to study the integration of the latter's high revisit rates earth observation capabilities to the former's naval tactical systems. Prométhée's future small satellites constellation would provide enhanced satellite surveillance capabilities.
- UK: The Labour has announced it would select a British consortium to build the 3 logistic vessels of the Fleet Solid Support program if it were to win the next elections.
- SPAIN: InfoDefensa reports that Navantia is currently developing two new military USVs (Unmanned Surface Vehicles). The 1st one, based on the Vendaval of the Ceuta Port Authority, is intended for mine-hunting missions, while the 2nd one would be smaller and primarily intended for ISR missions.

SPACE SYSTEMS

- CANADA: NEW ZEALAND: On Sept. 22, Rocket Lab announced that it aims to launch its new Neutron launch vehicle by 2024. The timeline is acknowledged as "pretty aggressive", yet the company has "confidence it can meet [them]".
- USA: On Sept. 29, the National Reconnaissance Office (NRO) awarded study contracts for space-based radio frequency (RF) data to 6 companies, incl. Aurora Insight, HawkEye 360, Kleos Space, PredaSAR, Spire Global and Umbra Lab. The agreements, signed under the Strategic Commercial Enhancements program, give the agency access to their systems so it can decide what commercial data to purchase for operational use.
- USA: Just 19 months since the opening of pre-orders for the Starlink system in Feb. 2021, SpaceX now confirmed it has produced roughly 1 million terminals to operate its constellation.
- USA: On Sept. 23, SpaceX said it's "highly likely" to attempt its first orbital Starship launch by November. The temptative launch could be as soon as late Oct. but a launch by the end of Nov. is reportedly more likely. The company still has ground testing to do, after an earlier static-fire test of 7/33 engines in the Super Heavy booster.
- USA: On Sept. 24, a United Launch Alliance (ULA) Delta IV Heavy rocket launched a spy satellite for the National Reconnaissance Office (NRO) as part of NROL-91 mission. This was the last launch from the Vandenberg base for the rocket.
- USA: On Sept. 28, Firehawk Aerospace Inc. raised \$15.5mn in Series-B round, out of its closing goal of \$17mn. The new funding, which will bring its total to nearly \$20mn, allow the company to do further R&D work as it does more testing and looks to ramp up production of its engines.



- CHINA: On Sept. 27, the Yaogan-36 reconnaissance satellite was launched aboard a Long March 2D rocket, while the Shiyan-16A, Shiyan-16B and Shiyan-17 were placed in orbit by a Long March 6. The latter are described as "experimental satellites for observation applications."
- CHINA: On Sept. 26, the Shiyan-14 and Shiyan-15 experimental satellites were launched aboard a Kuaizhou-1A. The first will be used for "scientific experiments and technology demonstrations" while the 2nd will be used for imaging.
- INDIA: On Sept 28, Hindustan Aeronautics Ltd. (HAL) opened a new Integrated Cryogenic Engine Manufacturing Facility in Bengaluru. The factory will produce and test the CE-20 engine used on the upper stage of the GSLV Mk.3 rocket, as well as a new liquid kerolox engine. Production will start next March.

- EUROPE: On Sept. 23, SES signed a contract with ESA for a quantum cryptography technology demonstration satellite. Eagle-1, scheduled for launch in 2024, will test the ability to conduct quantum key distribution (QKD) via satellite.
- BELGIUM: On Sept. 20, the SABCA signed an agreement with ArianeGroup to participate in the development of the Themis reusable rocket technology demonstrator..
- UK: Rolls-Royce made its 1st appearance at the International Astronautical Congress (IAC), signaling that the space sector is a priority. The company is developing a small nuclear reactor for moon/martian bases under a contract with the UK government.

