# UNLV Quarters

## 1

**Interp: The affirmative must defend appropriation as a general principle, not specify a subset**

**Appropriation is a definite uncountable noun–that’s generic**

**WMWRC 18**. William and Mary Writing Resource Center, 2018, Using Articles, <https://www.wm.edu/as/wrc/newresources/handouts/using-articles.pdf> //SR

Use of the articles a, an, and the can depend on any of four paired noun qualities: countable vs. noncountable, definite vs. indefinite, first vs. subsequent mention, and general vs. specific: Countable vs. Non-countable A and an are used if the noun can be counted. I ran into a post. (How many posts did you run into? Just one. Therefore, use a.) I ate a piece of cake. I saw an eagle. The is used when the noun cannot be counted. I ran into the water. (How many waters did you run into? The question doesn't make any sense because water is non-countable. Therefore, use the.) I ate the rice. I saw the milk spill. Indefinite Articles: a and an A and an signal that the noun modified is indefinite, referring to any member of a group. These indefinite articles are used with singular nouns when the noun is general; the corresponding indefinite quantity word some is used for plural general nouns. The rule is: a + a singular noun beginning with a consonant: a boy an + a singular noun beginning with a vowel: an elephant some + a plural noun: some girls Note that in English, the indefinite articles are used to indicate membership in a profession, nationality, or religion. I am a teacher. Brian is an Irishman. Seiko is a practicing Buddhist. Definite Article: the The definite article is used before singular and plural nouns when the noun is particular or specific. The signals that the noun is definite; it refers to a particular member of a group. Compare the indefinite and definite articles in the following pairs: A dog (any dog). The dog (that specific dog) The is used with both singular and plural nouns: the book, the cat the books, the cats The is not used with non-countable nouns referring to something in a general sense: [no article] Coffee is a popular drink. [no article] Japanese was his native language. [no article] Intelligence is difficult to quantify. The is used with non-countable nouns that are made more specific by a modifying phrase or clause: The coffee in my cup is too hot to drink. The Japanese he speaks is often heard in the countryside. The intelligence of animals is variable but undeniable. The is also used when a noun refers to something unique: the White House; the theory of relativity; the 2016 federal budget Geographical Uses of the DO NOT use the before: names of countries, except the Netherlands, the US, the Philippines (Italy, Mexico, Bolivia) names of cities, towns, or states (Seoul, Manitoba, Miami) names of streets (Washington Blvd., Main St.) names of lakes and bays, except with a group of lakes like the Great Lakes (Lake Louise, Lake Erie) names of mountains, except with ranges of mountains like the Andes or the Rockies or unusual names like the Matterhorn (Mount Everest, Mount Fuji) names of continents (Asia, Europe) names of islands except with island chains like the Aleutians, the Hebrides, or the Canary Islands (Easter Island, Maui, Key West) DO use the before: names of rivers, oceans and seas (the Nile, the Pacific, the Sea of Japan) points on the globe (the Equator, the North Pole) geographical areas (the Middle East, the West) deserts, forests, gulfs, and peninsulas (the Sahara, the Persian Gulf, the Black Forest, the Iberian Peninsula) First vs. Subsequent Mention A or an is used to introduce a noun when it is mentioned for the first time in a piece of writing. The is used afterward each time you mention that same noun. An awards ceremony at the Kremlin would not normally have attracted so much attention. But when it was leaked that Soviet President Konstantin Chernenko would be presenting medals to three cosmonauts, interest in the ceremony intensified. (Time, Sept. 17, 1984). Note: There is and there are can be used to introduce an indefinite noun at the beginning of a paragraph or essay. General vs. Specific A, an, and the can all be used to indicate that a noun refers to the whole class to which individual countable nouns belong. This use of articles is called generic, from the Latin word meaning "class." A tiger is a dangerous animal. (any individual tiger) The tiger is a dangerous animal. (all tigers: tiger as a generic category) The omission of articles also expresses a generic (or general) meaning: no article with a plural noun: Tigers are dangerous animals. (all tigers) no article with a non-countable noun: Anger is a destructive emotion. (any kind of anger)

**Violation: They only defend appropriation that produces debris**

**1–Precision outweighs - anything outside the res is arbitrary and unpredictable because the topic determines prep, not being bound by it lets them jettison any word. But, voting issues are dta to let us learn from our mistake**

**2–Limits and Ground - decimates clash by exploding limits to infinite forms appropriation with infinite possible interps of what constitutes it, each with different implications, political problems, and economic benefits which makes contesting the aff with unifying neg ground impossible and means they can always pick the most aff skewed slice of the res.**

**3–TVA – read your aff as an advantage under whole res – we still get your content education and sufficient aff ground by switching up aff advantages, frameworks, implementation, etc. But, 1ar theory checks pics and they incentivize more of them cuz nothing but cheaty generics link**

**Fairness and education are voters – debate’s a game that needs rules to evaluate it and it teaches portable skills that we use lifelong. Drop the debater - severance kills 1NC strat construction—1AR restart favors aff since it’s 7-6 time skew and they get 2 speeches to my one. No rvi - a) they’ll bait theory and prep it out with aff infinite prep—justifies infinite abuse and chilling us from checking abuse in fear of things like 2ar ethos which lets them recontextualize and always seem right on the issue b) forces the NC to go 7 minutes of theory because nothing else matters--outweighs because its the longest speech and the 2nr can never recover since the nc is our only route to generate offense. Competing interps - a) reasonability’s arbitrary & forces judge intervention especially with 2ar recontextualizations to always sound like the more reasonable debater b) norm setting - we find the best possible norms c) reasonability collapses - you use offense/defense paradigm to evaluate brightlines.**

## 2

**Interp – Unjust refers to a negative action – it means contrary.**

**Black Laws No Date** "What is Unjust?" https://thelawdictionary.org/unjust/ //Elmer

Contrary to right and justice, or to the enjoyment of his rights by another, or to the standards of conduct furnished by the laws.

**Violation – The Aff is a positive action – they go from “appropriation bad and should be banned” to “orbital use fees” as per 1NC Runnels and “defining space debris” as per 1NC Shah which is functionally extra-T**

**Shah 20** – Sachin, 8/30/20, [“Aug 30 The International Legal Regulation of Space Debris,” CORNELL UNDERGRADUATE LAW & SOCIETY REVIEW, Administrative, Policy, Technology,<https://www.culsr.org/articles/the-international-legal-regulation-of-space-debris>] Justin

Due to the Treaty’s weakness, many of the aforementioned scholars support **revising the Outer Space Treaty by clearly defining space debris**, increasing its **technology-specific language** to combat **space debris issues, and outlining specific punishments** to **negate the complete lack of enforcement** built into the current Treaty. While nations do recognize the danger that space debris pose to orbital operations, stronger laws must be enacted in order to de-escalate an imminent arms race and incentivize them to mitigate their debris. [10] Believing that one convention or treaty would be insufficient, N. Jasentuliyana recommends the creation of a regulatory regime to solve the growing problem of space debris. Such a regime would “effectively deal with these technical problems and establish international legal rules, standards and procedures on a continuing basis.” [11] Thus, one potential solution to the legal lack of space debris mitigation is establishing a lawmaking agency which specifically focuses on the issue of space debris. In addition to the creation of a legal agency which could hold actors accountable for the amount of space debris produced, international laws guiding the actions of private companies’ activities may also provide an answer, as will be discussed in greater detail below.

**No plan text in a vacuum–plan text not matching normal means is the worst version of their model and the policy defines solvency otherwise you’d just vote neg on presumption–your evidence isolates how absent redefining terms external to the res the plan would get circumvented which means you’d negate both ways**

**Standards –**

**1] Limits – making the topic bi-directional explodes predictability – it means that Aff’s can both increase non-exist property regimes in space AND decrease appropriation by private actors – makes the topic untenable**

**2] Ground – wrecks Neg Generics – we can’t say appropriation good since the 1AC can create new views on Outer Space Property Rights that circumvent our links**

**3] TVA – just defend that space appropriation is bad**

## 3

**Interp: If the Affirmative specifies “Appropriation that produces Debris” – they must clearly delineate a clear parameter and definition for what “produces Debris” constitutes**

**Munters 16** Ward Munters 2016 "Space debris conundrum for international law makers"<https://room.eu.com/article/space-debris-conundrum-for-international-law-makers> (Leuven Centre for Global Governance Studies, Belgium)//Elmer

A fundamental and abstract legal matter in this regard, that appears almost too simple and too basic to present an obstacle, is the question: what is space debris? Technical definitions used by scientists and engineers, as well as in the technical and non-binding Space Debris Mitigation Guidelines [3] of the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) focus unvaryingly on the non-functional nature of debris: space debris are all man-made objects, including fragments or elements thereof, in Earth orbit or re-entering into Earth’s atmosphere that are non-functional. However, this definition, intuitive as it may be, cannot easily be construed into an international legal definition. The existing space law treaties simply do not mention ‘space debris’ anywhere. The closest related, applicable and rather vague term in the treaties is that of ‘space object’. The treaties apply this term to any object launched into space to determine important legal consequences such as which State has sole jurisdiction and control over the object, which State can register the object or which States are liable for damage caused by the object in space or on Earth. Nevertheless, the treaties do not define what exactly is a ‘space object’ and, more importantly, they do not consider the functional or non-functional nature of the space object in applying these important legal consequences to it. Therefore, international space law does not contain any provisions that could form the basis for a legal distinction between valuable spacecraft and supposedly worthless space debris. Faced with this legal uncertainty, the majority of legal experts appear to agree that even if a satellite were to become non-functional or to catastrophically break up into separate fragments, these will still constitute a ‘space object’ for the purposes of the treaties and carry with them all legal ramifications thereof. The Outer Space Treaty declares that any State that has registered a space object shall retain legal and de facto jurisdiction and control over that object. As a piece of space debris is considered a ‘space object’ for legal purposes, even if the State were to lose de facto control over the space object when it becomes non-functional or uncontrollable, it retains sole legal jurisdiction and control as per the treaty. Therefore, it is uncertain whether space objects, their component parts or fragments thereof can legally be abandoned or considered abandoned, irrespective of their non-functional status. This notion is reinforced by the fact that space faring States have hitherto not expressed a right to abandon their non-functional satellites in space. This sheds severe doubt on the possibility of introducing a legal regime of ‘salvage’, similar to maritime law, whereby actors other than the State of registry could freely remove pieces of debris that pose a threat in Earth orbit.

**The net benefit is ground – without anything delineated in the 1AC – it can become as limiting or under-limiting as they deem strategic given the 1NC which makes Negative prep impossible since they will always shift the ground of “what produces debris. Cx doesn’t check–it’s non verifiable and skews preround prep–they get away with abuse no risk justifying infinite abuse BUT no regress since the interp is grounded in the lit and limited words in the res mean limited interps. Worst case neg on presumption since the aff is too vague to be enforced**

## 4

**Macron has a shallow lead now, but economic recession cedes to the ultra-right**

William **Horobin et. al**, Ania Nussbaum,Caroline Alexander, 1-12-**2022**, "For Macron and France, It’s the Economy, Stupide," Bloomberg,<https://www.bloomberg.com/news/features/2022-01-13/french-election-2022-macron-second-term-could-hinge-on-economic-recovery>]

For five years, Emmanuel Macron has been fending off challenges from the fringes of mainstream French politics. It began in the 2017 election runoff against far-right nationalist Marine Le Pen, continued through a showdown with the yellow vests protest movement, and is culminating in a culture-war clash with ultra-right-wing polemicist Éric Zemmour, who entered the race for the presidency in November. But as he seeks reelection in April, the president who was nurtured in the top echelons of the French technocracy has a potential knockout punch to throw: the robust economy. With polls showing that the French are veering right, Macron regularly gives nods to that part of the electorate. He has praised former President Nicolas Sarkozy for inciting a debate on “national identity,” hired a hard-line interior minister, and gave an interview to a far-right publication in which he spoke about immigration and Islam. In turn, his star has faded among left-wing voters. But rather than becoming ensnared in confrontations about identity and immigration, Macron’s most senior supporters are urging him to lean on his economic record. “At a time when crowing about France’s decline seems to be in fashion, we have among the best economic growth figures in the euro zone and we got back to pre-crisis levels of activity three months sooner than expected,” Finance Minister Bruno Le Maire told Parliament at the start of December, adding: “Let’s be proud of our economic policy, the jobs we have created, investment that is recovering, the attractiveness of France.” Indexed GDP France’s output reached pre-crisis levels ahead of its European peers After a precipitous crash early in the Covid-19 pandemic, France has recorded a standout rebound, with output reaching pre-crisis levels in the fall­—ahead of peers and far sooner than even Macron’s team expected. Vast spending to support households and firms during lockdowns preserved the country’s economic foundations, and Macron has built on them with the high-speed deployment of a €100 billion ($113 billion) recovery plan. Le Maire and others point to an employment market and corporate investment trends which suggest Macron’s earlier bet on labor and tax reforms may finally be delivering results. If they are right, that would mark a major shift in the course of European economic history. For years, France has been labeled as one of the bloc’s problem economies, unable to adapt to globalization and grow and create jobs like its bigger neighbor, Germany. French Unemployment Rate Holger Schmieding, the chief economist of Berenberg, in 2017 posited a “golden decade” ahead for France and says his thesis still holds. Even if Macron should stumble in the polls, whoever wins could potentially inherit an economic base some have compared to the legacy left to Angela Merkel by reformist German Chancellor Gerhard Schröder. “The rebound of France is one of the most interesting longer-term stories, and it is a key factor in stabilizing the core of Europe for good,” Schmieding says. “The return to a balance between Germany and France has huge political ramifications beyond the numbers.” Walk through the streets of Paris, and most buildings you see have been unaltered for more than a century. Similarly, the French themselves often remark on how resistant to change they are, even as they’ll be quick to bemoan the state’s regulatory overreach into the economy. Seven years ago, Macron was the economy minister and political neophyte tasked by President François Hollande to address just that inertia with so-called “structural reforms” that economists and international institutions had long implored France to undertake. He swept across the portfolios of his fellow ministers, loosening everything from the labor code to transportation regulations, and further opened the door to state asset sales. The controversial pro-business tilt of the law afforded Macron the necessary notoriety to quit Hollande’s Socialist government and craft his own election-winning political brand, sometimes dubbed “Macronomics” by the French media. Quickly after taking office in 2017, Macron used contentious decree-like tools to push further changes to labor laws through Parliament. And in his first budget, the then 39-year-old president picked apart France’s heavy taxes on wealth and capital. Such changes take time to bear fruit, and there is debate over Macron’s record and whether it’s a clear election asset for him. A recent report by the Institut des Politiques Publiques found that while his policies as president, including during Covid, have boosted disposable incomes overall—particularly for working French people—they didn’t for the poorest segment of the population. Another, from the government think tank Conseil d’Analyse Economique, found no link between the changes to taxation and improvements in wages and investment. And some of his planned overhauls remain on the to-do list, including the pension reform he paused during the pandemic. Yet even if it is tricky to confirm cause and effect, many indicators have improved in the last five years, giving Macron plenty of numbers to bolster his credibility. The tax cuts have helped raise company profit margins back to levels not seen since before the global financial crisis. That’s no vote-winner in a country where corporate profits are at best viewed with suspicion, but he can point to a corresponding increase in investment rates, which have reached their highest level since the 1970s. The pandemic did little in France to disrupt the trend of firms putting more money back into the economy—in fact, investment levels are higher now than before the crisis, while Europe as a whole still hasn’t recovered. French Investment Rate Entrepreneurial spirits are running high with the monthly count of new companies continuing on a sharp upward curve that began in 2017; a trend only briefly interrupted by the pandemic. And foreign investors are piling into France, pushing the country above the U.K. and Germany in consulting firm EY’s ranking for attracting projects that create new facilities and jobs—even though the number of investment projects dropped last year. Number of Projects With Foreign Investment The labor market is strong despite the upheaval of lockdowns. Unemployment has dropped to levels seen just prior to the first wave of Covid, and the employment rate hit 67.5%, its highest level since records began nearly a half-century ago. (This may be partly attributable to more women joining the workforce and French workers retiring later, rather than any of Macron’s policies.) The French leader can also boast some success in raising the ratio of new hires on coveted open-ended contracts—a crucial ticket in France to access housing and loans. Contracts Permanent contracts as a share of new contracts of more than one month And despite media portrayals of a nation of discontents, one long-running national survey indicates the French actually consider their living standards higher with Macron in the Élysée Palace than under either of his two most recent predecessors. French Living Standards Index There are holes in the economic record—most notably a still-gaping trade deficit that shows years of French industrial decline, as well as the debt mountain left behind by the pandemic. But come the election, the stars may align for the incumbent president if he can show that “Macronomics” is intact, with economic activity continuing to rebound from pandemic lows and consumers having billions of extra euros thanks to Covid relief plans. The timing could be decisive, because the recent surge of the omicron variant has driven French Covid cases to record numbers, put pressure on hospitals, and embroiled Macron in a controversy over his use of vulgar slang directed at the unvaccinated. He’ll also be counting on the longer-term economic argument to offset more recent concerns about surging inflation, as well as doubts about whether he’s delivered on his pledges to improve social mobility and unite a country polarized by right-left divisions on issues ranging from religion to security. If Macron prevails, he would be the first incumbent to win reelection in France since Jacques Chirac 20 years ago. With Olaf Scholz now chancellor in Germany and Mario Draghi leading Italy, that raises the prospect of Europe’s three largest economies being run by closely aligned champions of closer EU integration who are eager to project the bloc’s economic heft. Should he be defeated by Le Pen, the political landscape in France and Europe would look significantly different. While she has dropped her opposition to the euro, her National Rally party remains staunchly opposed to Macron’s agenda and wants to put the brakes on free circulation and trade within the bloc. Valérie Pécresse, a center-right candidate, would provide more continuity on the economic front. Macron has already dangled the prospect of many more years of his economic approach. The furlough scheme created in crisis has been transformed into a long-term program that provides a financial backstop for firms and their employees to have more flexible working hours. Looking further ahead still, he has presented a “France 2030” plan to pour public money into high-risk industrial investments. And pro-business fiscal policies are back on the agenda, alongside a pledge to revive the pension reform. “Our responsibility is to continue to offer you an economic, tax, and financial environment that is as favorable to you as possible,” Le Maire told business leaders at a gathering in Paris on Jan. 5. “Believe me, there’s a lot of work to do, and thank goodness—otherwise we’d get bored in the coming years.”

**Commercial space industry spills over to the economy writ large --- it’s a massive part of France’s economy**

**OECD 20** [Organisation for Economic Co-operation and Development is an intergovernmental economic organisation with 38 member countries, founded in 1961 to stimulate economic progress and world trade. “MEASURING THE ECONOMIC IMPACT OF THE SPACE SECTOR KEY INDICATORS AND OPTIONS TO IMPROVE DATA.” Oct. 7, 2020. https://www.oecd.org/sti/inno/space-forum/measuring-economic-impact-space-sector.pdf]

1. Conservative estimates. Budgets include data for civil and defence programmes, when available. For European countries, national estimates include contributions to the European Union, European Space Agency, Eumetsat and other international programmes, where applicable. The figure does not include the aggregate budget for the European Union. Source: Government budget sources and OECD databases. The majority of G20 economies’ space budgets constituted less than 0.05% of GDP in 2019 (including civil and military space activities where data are available). Within these budgets, government investments in space R&D are generally much smaller than other government-funded research in domains such as health, agriculture or energy. What is the space economy? The space economy can be defined as “the full range of activities and the use of resources that create and provide value and benefits to human beings in the course of exploring, understanding, managing and utilising space”(OECD, forthcoming). It goes well beyond the space manufacturing sector, also comprising the increasingly pervasive impacts of space-derived products, services and knowledge on economies and societies. For measurement purposes, the space economy can be divided into three components, as elaborated in Figure 2: • The upstream sector (e.g. R&D, manufacturing and launch) • The downstream sector (space infrastructure operations and “down-to-earth” products and services that directly rely satellite data and signals to operate and function) • Activities that are derived from space-derived activities but not dependent on it to function (e.g. technology transfers from the space sector to the automotive or medical sectors) Relevant actors and activities are identified by a combination of industry surveys and statistical analysis. Figure 2. Defining the perimeters of the space economy Source: OECD (forthcoming), Handbook on Measuring the Space Economy, second edition. Estimated annual global commercial revenues from the space sector are in the range of USD 280-300 billion (OECD, 2019). The bulk of the revenues come from commercial satellite services (USD 126-130 billion) based on satellite capacity (e.g. telecommunications signals), while space systems’ manufacturing are valued at less than USD 20 billion, and often sustained by government procurement. The second largest share of revenues (USD 125-130 billion) consists of consumer equipment, which is a market dominated by consumer electronics companies (e.g. devices and chipsets to receive positioning signals, satellite television dishes). But space activities have impacts far beyond commercial revenues, with spillovers in many segments of the economy, for instance in agriculture, transport and the environment. Technology transfers from initial space exploration and human spaceflight missions also find their way into many diverse commercial products (e.g. medical imagery, water and air purifying systems). A report commissioned by the US Department of Commerce estimates that in the United States alone, the Global Positioning System (GPS) may have generated socio-economic benefits worth some USD 1.4 trillion since its introduction in the 1980s (O’Connor et al, 2019). What are the impacts of space activities and how do we measure them? As the applications of space technologies multiply, so do the derived impacts (Figure 3).The most commonly identified benefits of space activities include positive impacts on GDP through employment and revenue gains, diverse economic benefits – especially cost avoidances associated with space-based meteorological weather observations – , technological and scientific excellence, improved food safety, and innovation (OECD, 2019). Space-based infrastructure plays an increasing role in supporting critical societal functions such as telecommunications, finance and utilities. As an illustration, space manufacturers and agencies contributed actively to the response efforts during the COVID-19 crisis, by producing medical equipment, providing storage and processing capabilities for modelling and other research needs, and studying impacts. Space actors also provided high-speed connectivity to remote locations (e.g. establishing links to remote hospitals, residential and small business customers, and deployment of online solutions schooling) as well as earth observation imagery for industry intelligence and monitoring of remotely located infrastructure (OECD, 2020).

**Far-right victory ensures a laundry list of impacts – Euro demise, independence referendum, and racist immigration policy.**

**Goodwin, PhD, 17** (Goodwin, Matthew J. (Prof. PoliSci@University of Kent, Visiting Fellow@Chatham House, Postdoctoral Fellowship@Economic and Social Research Council, PhD PoliSci and Gov@University of Bath). “What a Le Pen Win Would Look Like,” New York Times, March 23, 2017. https://www.nytimes.com/2017/03/23/opinion/what-a-marine-le-pen-win-would-look-like.html//SHL)

In the short term, a National Front win would throw the European Union into a deep crisis. Political scientists have argued that over the past two decades, people’s attitudes toward the union have passed through two stages: from broad acceptance in the 1960s and ’70s to an instinctive skepticism from the ’80s onward. A victory for Ms. Le Pen, coming after Brexit, would underscore that Europeans have now arrived at a third phase: active rebellion. But what of French domestic politics first? Ms. Le Pen’s program rests on the assumption that her presidential victory is followed by her party’s achieving a parliamentary majority after elections to the National Assembly in June. Given that the National Front has just two seats in Parliament, Ms. Le Pen would need to draw on support from the center-right Republicans. She is therefore gambling on the hope that this will be the year when the so-called Republican Front — an unwritten law in French politics whereby the main parties refuse to work with the National Front — breaks down. This, too, is unlikely. But let us entertain the scenario that Ms. Le Pen does get this far. Since its formation in 1972, the National Front has won attention mainly for hard-right policies like restricting immigration and combating the “Islamification” of French society. If she were to stay true to those commitments, President Le Pen would move to leave the Schengen border-free zone, slash net migration to 10,000 per year, strip dual nationals of their French citizenship and put 15,000 more police officers on the streets. But of much greater significance is her position on the euro and the European Union, for a Le Pen presidency could spell the demise of the currency and a further unraveling of the union. Crises on multiple fronts — the re-emerging financial crisis in Greece, a creaking Italian banking sector, the prospect of more refugees arriving now that winter has passed and Brexit — are already placing dangerous stress on the union. Although growth is slowly returning to the eurozone, a French withdrawal on the orders of Ms. Le Pen could still deliver the currency union a fatal blow. Ms. Le Pen is no mild Euroskeptic. She views the euro as a “political weapon” that the European Central Bank, the European Union and global financiers have used to enslave France. Ms. Le Pen firmly believes that the euro is destined to fail and that while leaving would be costly, it would still be cheaper than hanging around for the complete collapse of the eurozone. “The French people are sitting on the Titanic, known as the euro, and they are listening to the violins,” her strategist in London said. “We are going to push them off and into the lifeboats.” Ms. Le Pen plans to do this by renegotiating the terms of France’s membership in the union, talks that conceivably would coincide with the already fraught Brexit negotiations. She will demand a return of full national sovereignty, including monetary independence, fiscal and financial autonomy. Her lieutenants talk openly about wanting to leave the euro, redenominating French euro assets and debt in a new currency on a “one franc to one euro” basis, and undertaking competitive devaluations. A newly independent Bank of France, they argue, could buy French government bonds in the secondary market and suppress yields. To strengthen her hand in talks, her officials say, Ms. Le Pen would, in her first year in office as president, use Article 11 of the French Constitution to conduct a referendum on whether France should leave the European Union altogether: Frexit. Most French voters remain in favor of union membership and the euro. But given her program, the very election of Ms. Le Pen would change the game: Investors would sell off French assets, markets would fall, and the eurozone recovery itself could falter. Ordinary French savers, worried about the risk of devaluation from a return to the franc, would rush to withdraw their euros for fear of capital controls being imposed, as they were on Greece. A major run on the euro, and capital flight spreading across the continent, would destabilize the currency union as markets began to anticipate its dissolution.

**Collapse of the Euro causes recession greater than World War II due to fragility from COVID.**

**Goranitis 4/1** Dimitrios Goranitis [Financial Services Industry Risk and Regulatory Advisory Partner in Deloitte Romania], 4-1-2020, "Why the most significant macroeconomic risk is not the upcoming recession, but the collapse of the Euro and the European Union,"<https://www2.deloitte.com/ro/en/pages/business-continuity/articles/why-the-most-significant-macroeconomic-risk-is-not-the-upcoming-recession-but-the-collapse-of-the-euro-and-the-european-union.html> SM

Why the most significant macroeconomic risk is not the upcoming recession, but the collapse of the Euro and the European Union 27 April 2020 This article expresses the author's own opinions and it does not reflect the position of Deloitte Romania Ten years after the credit crisis, the European Union demonstrates that it has learned very little on how to unite and decisively take pan-EU measures to tackle crisis and support recovery. A series of long negotiations between the major economies of the South versus the North, with the European Central Bank (ECB) awkwardly stuck in the middle, not only doesn’t address the sustainability of the European economy as a total, but it feeds, as in the last crisis, the speculative appetite of the markets towards sovereign debt of the weaker links. However, this time, EU is not called to bail out a small economy like Greece, but Italy and Spain, its 3rd and 4th largest economies, accounting for approximately EUR 3.5 trillion of its Gross Domestic Product. As the COVID-19 lockdown seems to be running the middle of the first wave course, experts struggle to identify the economic impact and its duration, with IMF predicting that the toll for the economy will only be comparable to that of World War II. Despite a recent financial crisis in the EU that triggered a political and existential crisis with Grexit being the dominant scenario and Brexit the unexpected outcome, member states have resorted again to national crisis management and national recovery strategy, while EU institutions are trying hopelessly to demonstrate their existence. Northern member states reject the idea of Eurobonds, a mutualization of debt, and have turned down ECB’s proposal for an EU bad bank able to deal collectively with a second wave of Non-Performing Loans (NPL) across Europe. During the credit crisis in the last decade, the same message from EU sparked the markets to speculate on sovereign debt of the weaker countries and created an extended financial crisis in the south of Europe that ended up becoming a threat to the Euro itself as a global currency and to the foundation of the European Union. The result was a Greek bailout that left the Greek economy with a GDP reduced by 30%, a result comparable only to failed state economies like Libya and Syria, and a sovereign debt close to 200% of GDP admittedly not viable or manageable. But what is different now? First of all, Italy and Spain have seen how the Greek bailout program failed under the guidance of European Stability Mechanism (ESM) and IMF merely based on austerity policies. Italy has repeatedly stated that it will not resort to ESM bailouts in fear of conditions imposed by Troika similar to Greece. This time around, Italy and Spain are too big to fail and too big to “discipline” into a forced bail out. Second, this is not just a financial crisis, this is the result of a health and humanitarian crisis. Lack of “togetherness” from EU member states has sparked a tremendous anti-EU sentiment in the countries worst impacted. Italy’s anti-EU sentiment rose from 26% in November to 49% in March. Third, this new crisis comes very close to Brexit and ongoing political instability due to rising populism in Italy, France and Eastern Europe, and it doesn’t seem to bring member states together, but rather divide them. This time around, EU is already too fragile to withstand more nationalism. Last, the ECB has already used most of its firing power, with interest rates being at record low and quantitative easing at record high. Its war chest is not that impressive, hence the markets seem unaffected by its intervention. Statements such as “ECB will do whatever it takes” do not yield the same result as they did ten years ago. This time around, a controlled breakup of the EU or its reduction to a trade agreement and the abandonment of the single currency become a real scenario, and not a speculative tool for the markets. Impossible to quantify the probability of that scenario, but after Brexit and US-China trade war, who is to say what is probable or not?

**Decline cascades---nuclear war**

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Various scholars and institutions regard global social instability as the greatest threat facing this decade. The catalyst has been postulated to be a Second Great Depression which, in turn, will have profound implications for global security and national integrity. This paper, written from a broad systems perspective, illustrates how emerging risks are getting more complex and intertwined; blurring boundaries between the economic, environmental, geopolitical, societal and technological taxonomy used by the World Economic Forum for its annual global risk forecasts. Tight couplings in our global systems have also enabled risks accrued in one area to snowball into a full-blown crisis elsewhere. The COVID-19 pandemic and its socioeconomic fallouts exemplify this systemic chain-reaction. Onceinexorable forces of globalization are rupturing as the current global system can no longer be sustained due to poor governance and runaway wealth fractionation. The coronavirus pandemic is also enabling Big Tech to expropriate the levers of governments and mass communications worldwide. This paper concludes by highlighting how this development poses a dilemma for security professionals. Key Words: Global Systems, Emergence, VUCA, COVID-9, Social Instability, Big Tech, Great Reset INTRODUCTION The new decade is witnessing rising volatility across global systems. Pick any random “system” today and chart out its trajectory: Are our education systems becoming more robust and affordable? What about food security? Are our healthcare systems improving? Are our pension systems sound? Wherever one looks, there are dark clouds gathering on a global horizon marked by volatility, uncertainty, complexity and ambiguity (VUCA). But what exactly is a global system? Our planet itself is an autonomous and selfsustaining mega-system, marked by periodic cycles and elemental vagaries. Human activities within however are not system isolates as our banking, utility, farming, healthcare and retail sectors etc. are increasingly entwined. Risks accrued in one system may cascade into an unforeseen crisis within and/or without (Choo, Smith & McCusker, 2007). Scholars call this phenomenon “emergence”; one where the behaviour of intersecting systems is determined by complex and largely invisible interactions at the substratum (Goldstein, 1999; Holland, 1998). The ongoing COVID-19 pandemic is a case in point. While experts remain divided over the source and morphology of the virus, the contagion has ramified into a global health crisis and supply chain nightmare. It is also tilting the geopolitical balance. China is the largest exporter of intermediate products, and had generated nearly 20% of global imports in 2015 alone (Cousin, 2020). The pharmaceutical sector is particularly vulnerable. Nearly “85% of medicines in the U.S. strategic national stockpile” sources components from China (Owens, 2020). An initial run on respiratory masks has now been eclipsed by rowdy queues at supermarkets and the bankruptcy of small businesses. The entire global population – save for major pockets such as Sweden, Belarus, Taiwan and Japan – have been subjected to cyclical lockdowns and quarantines. Never before in history have humans faced such a systemic, borderless calamity. COVID-19 represents a classic emergent crisis that necessitates real-time response and adaptivity in a real-time world, particularly since the global Just-in-Time (JIT) production and delivery system serves as both an enabler and vector for transboundary risks. From a systems thinking perspective, emerging risk management should therefore address a whole spectrum of activity across the economic, environmental, geopolitical, societal and technological (EEGST) taxonomy. Every emerging threat can be slotted into this taxonomy – a reason why it is used by the World Economic Forum (WEF) for its annual global risk exercises (Maavak, 2019a). As traditional forces of globalization unravel, security professionals should take cognizance of emerging threats through a systems thinking approach. METHODOLOGY An EEGST sectional breakdown was adopted to illustrate a sampling of extreme risks facing the world for the 2020-2030 decade. The transcendental quality of emerging risks, as outlined on Figure 1, below, was primarily informed by the following pillars of systems thinking (Rickards, 2020): • Diminishing diversity (or increasing homogeneity) of actors in the global system (Boli & Thomas, 1997; Meyer, 2000; Young et al, 2006); • Interconnections in the global system (Homer-Dixon et al, 2015; Lee & Preston, 2012); • Interactions of actors, events and components in the global system (Buldyrev et al, 2010; Bashan et al, 2013; Homer-Dixon et al, 2015); and • Adaptive qualities in particular systems (Bodin & Norberg, 2005; Scheffer et al, 2012) Since scholastic material on this topic remains somewhat inchoate, this paper buttresses many of its contentions through secondary (i.e. news/institutional) sources. ECONOMY According to Professor Stanislaw Drozdz (2018) of the Polish Academy of Sciences, “a global financial crash of a previously unprecedented scale is highly probable” by the mid- 2020s. This will lead to a trickle-down meltdown, impacting all areas of human activity. The economist John Mauldin (2018) similarly warns that the “2020s might be the worst decade in US history” and may lead to a Second Great Depression. Other forecasts are equally alarming. According to the International Institute of Finance, global debt may have surpassed $255 trillion by 2020 (IIF, 2019). Yet another study revealed that global debts and liabilities amounted to a staggering $2.5 quadrillion (Ausman, 2018). The reader should note that these figures were tabulated before the COVID-19 outbreak. The IMF singles out widening income inequality as the trigger for the next Great Depression (Georgieva, 2020). The wealthiest 1% now own more than twice as much wealth as 6.9 billion people (Coffey et al, 2020) and this chasm is widening with each passing month. COVID-19 had, in fact, boosted global billionaire wealth to an unprecedented $10.2 trillion by July 2020 (UBS-PWC, 2020). Global GDP, worth $88 trillion in 2019, may have contracted by 5.2% in 2020 (World Bank, 2020). As the Greek historian Plutarch warned in the 1st century AD: “An imbalance between rich and poor is the oldest and most fatal ailment of all republics” (Mauldin, 2014). The stability of a society, as Aristotle argued even earlier, depends on a robust middle element or middle class. At the rate the global middle class is facing catastrophic debt and unemployment levels, widespread social disaffection may morph into outright anarchy (Maavak, 2012; DCDC, 2007). Economic stressors, in transcendent VUCA fashion, may also induce radical geopolitical realignments. Bullions now carry more weight than NATO’s security guarantees in Eastern Europe. After Poland repatriated 100 tons of gold from the Bank of England in 2019, Slovakia, Serbia and Hungary quickly followed suit. According to former Slovak Premier Robert Fico, this erosion in regional trust was based on historical precedents – in particular the 1938 Munich Agreement which ceded Czechoslovakia’s Sudetenland to Nazi Germany. As Fico reiterated (Dudik & Tomek, 2019): “You can hardly trust even the closest allies after the Munich Agreement… I guarantee that if something happens, we won’t see a single gram of this (offshore-held) gold. Let’s do it (repatriation) as quickly as possible.” (Parenthesis added by author). President Aleksandar Vucic of Serbia (a non-NATO nation) justified his central bank’s gold-repatriation program by hinting at economic headwinds ahead: “We see in which direction the crisis in the world is moving” (Dudik & Tomek, 2019). Indeed, with two global Titanics – the United States and China – set on a collision course with a quadrillions-denominated iceberg in the middle, and a viral outbreak on its tip, the seismic ripples will be felt far, wide and for a considerable period. A reality check is nonetheless needed here: Can additional bullions realistically circumvallate the economies of 80 million plus peoples in these Eastern European nations, worth a collective $1.8 trillion by purchasing power parity? Gold however is a potent psychological symbol as it represents national sovereignty and economic reassurance in a potentially hyperinflationary world. The portents are clear: The current global economic system will be weakened by rising nationalism and autarkic demands. Much uncertainty remains ahead. Mauldin (2018) proposes the introduction of Old Testament-style debt jubilees to facilitate gradual national recoveries. The World Economic Forum, on the other hand, has long proposed a “Great Reset” by 2030; a socialist utopia where “you’ll own nothing and you’ll be happy” (WEF, 2016). In the final analysis, COVID-19 is not the root cause of the current global economic turmoil; it is merely an accelerant to a burning house of cards that was left smouldering since the 2008 Great Recession (Maavak, 2020a). We also see how the four main pillars of systems thinking (diversity, interconnectivity, interactivity and “adaptivity”) form the mise en scene in a VUCA decade. ENVIRONMENTAL What happens to the environment when our economies implode? Think of a debt-laden workforce at sensitive nuclear and chemical plants, along with a concomitant surge in industrial accidents? Economic stressors, workforce demoralization and rampant profiteering – rather than manmade climate change – arguably pose the biggest threats to the environment. In a WEF report, Buehler et al (2017) made the following pre-COVID-19 observation: The ILO estimates that the annual cost to the global economy from accidents and work-related diseases alone is a staggering $3 trillion. Moreover, a recent report suggests the world’s 3.2 billion workers are increasingly unwell, with the vast majority facing significant economic insecurity: 77% work in part-time, temporary, “vulnerable” or unpaid jobs. Shouldn’t this phenomenon be better categorized as a societal or economic risk rather than an environmental one? In line with the systems thinking approach, however, global risks can no longer be boxed into a taxonomical silo. Frazzled workforces may precipitate another Bhopal (1984), Chernobyl (1986), Deepwater Horizon (2010) or Flint water crisis (2014). These disasters were notably not the result of manmade climate change. Neither was the Fukushima nuclear disaster (2011) nor the Indian Ocean tsunami (2004). Indeed, the combustion of a long-overlooked cargo of 2,750 tonnes of ammonium nitrate had nearly levelled the city of Beirut, Lebanon, on Aug 4 2020. The explosion left 204 dead; 7,500 injured; US$15 billion in property damages; and an estimated 300,000 people homeless (Urbina, 2020). The environmental costs have yet to be adequately tabulated. Environmental disasters are more attributable to Black Swan events, systems breakdowns and corporate greed rather than to mundane human activity. Our JIT world aggravates the cascading potential of risks (Korowicz, 2012). Production and delivery delays, caused by the COVID-19 outbreak, will eventually require industrial overcompensation. This will further stress senior executives, workers, machines and a variety of computerized systems. The trickle-down effects will likely include substandard products, contaminated food and a general lowering in health and safety standards (Maavak, 2019a). Unpaid or demoralized sanitation workers may also resort to indiscriminate waste dumping. Many cities across the United States (and elsewhere in the world) are no longer recycling wastes due to prohibitive costs in the global corona-economy (Liacko, 2021). Even in good times, strict protocols on waste disposals were routinely ignored. While Sweden championed the global climate change narrative, its clothing flagship H&M was busy covering up toxic effluences disgorged by vendors along the Citarum River in Java, Indonesia. As a result, countless children among 14 million Indonesians straddling the “world’s most polluted river” began to suffer from dermatitis, intestinal problems, developmental disorders, renal failure, chronic bronchitis and cancer (DW, 2020). It is also in cauldrons like the Citarum River where pathogens may mutate with emergent ramifications. On an equally alarming note, depressed economic conditions have traditionally provided a waste disposal boon for organized crime elements. Throughout 1980s, the Calabriabased ‘Ndrangheta mafia – in collusion with governments in Europe and North America – began to dump radioactive wastes along the coast of Somalia. Reeling from pollution and revenue loss, Somali fisherman eventually resorted to mass piracy (Knaup, 2008). The coast of Somalia is now a maritime hotspot, and exemplifies an entwined form of economic-environmental-geopolitical-societal emergence. In a VUCA world, indiscriminate waste dumping can unexpectedly morph into a Black Hawk Down incident. The laws of unintended consequences are governed by actors, interconnections, interactions and adaptations in a system under study – as outlined in the methodology section. Environmentally-devastating industrial sabotages – whether by disgruntled workers, industrial competitors, ideological maniacs or terrorist groups – cannot be discounted in a VUCA world. Immiserated societies, in stark defiance of climate change diktats, may resort to dirty coal plants and wood stoves for survival. Interlinked ecosystems, particularly water resources, may be hijacked by nationalist sentiments. The environmental fallouts of critical infrastructure (CI) breakdowns loom like a Sword of Damocles over this decade. GEOPOLITICAL The primary catalyst behind WWII was the Great Depression. Since history often repeats itself, expect familiar bogeymen to reappear in societies roiling with impoverishment and ideological clefts. Anti-Semitism – a societal risk on its own – may reach alarming proportions in the West (Reuters, 2019), possibly forcing Israel to undertake reprisal operations inside allied nations. If that happens, how will affected nations react? Will security resources be reallocated to protect certain minorities (or the Top 1%) while larger segments of society are exposed to restive forces? Balloon effects like these present a classic VUCA problematic. Contemporary geopolitical risks include a possible Iran-Israel war; US-China military confrontation over Taiwan or the South China Sea; North Korean proliferation of nuclear and missile technologies; an India-Pakistan nuclear war; an Iranian closure of the Straits of Hormuz; fundamentalist-driven implosion in the Islamic world; or a nuclear confrontation between NATO and Russia. Fears that the Jan 3 2020 assassination of Iranian Maj. Gen. Qasem Soleimani might lead to WWIII were grossly overblown. From a systems perspective, the killing of Soleimani did not fundamentally change the actor-interconnection-interaction adaptivity equation in the Middle East. Soleimani was simply a cog who got replaced.

## 5

**CP: The appropriation of outer space through the production of space debris by private entities is unjust except for space elevators. We’ll defend 1ac normal means**

**Space Elevators constitute Appropriation – they impede orbits.**

**Matignon 19** Louis de Gouyon Matignon 3-3-2019 "LEGAL ASPECTS OF THE SPACE ELEVATOR TRANSPORTATION SYSTEM"<https://www.spacelegalissues.com/space-law-legal-aspects-of-the-space-elevator-transportation-system/> [PhD in space law (co-supervised by both Philippe Delebecque, from Université Paris 1 Panthéon-Sorbonne, France, and Christopher D. Johnson, from Georgetown University || regularly write articles on the website Space Legal Issues so as to popularise space law and public international law]//Elmer

An Earth-based space elevator would consist of a cable with one end attached to the surface near the equator and the other end in space beyond geostationary orbit. An orbit is the curved path through which objects in space move around a planet or a star. The 1967 Treaty’s regime and customary law enshrine the principle of non-appropriation and freedom of access to orbital positions. Space Law and International Telecommunication Laws combined to protect this use against any interference. The majority of space-launched objects are satellites that are launched in Earth’s orbit (a very small part of space objects – scientific objects for space exploration – are launched into outer space beyond terrestrial orbits). It is important to precise that an orbit does not exist: satellites describe orbits by obeying the general laws of universal attraction. Depending on the launching techniques and parameters, the orbital trajectory of a satellite may vary. Sun-synchronous satellites fly over a given location constantly at the same time in local civil time: they are used for remote sensing, meteorology or the study of the atmosphere. Geostationary satellites are placed in a very high orbit; they give an impression of immobility because they remain permanently at the same vertical point of a terrestrial point (they are mainly used for telecommunications and television broadcasting). A geocentric orbit or Earth orbit involves any object orbiting Planet Earth, such as the Moon or artificial satellites. Geocentric (having the Earth as its centre) orbits are organised as follow: 1) Low Earth orbit (LEO): geocentric orbits with altitudes (the height of an object above the average surface of the Earth’s oceans) from 100 to 2 000 kilometres. Satellites in LEO have a small momentary field of view, only able to observe and communicate with a fraction of the Earth at a time, meaning a network or constellation of satellites is required in order to provide continuous coverage. Satellites in lower regions of LEO also suffer from fast orbital decay (in orbital mechanics, decay is a gradual decrease of the distance between two orbiting bodies at their closest approach, the periapsis, over many orbital periods), requiring either periodic reboosting to maintain a stable orbit, or launching replacement satellites when old ones re-enter. 2) Medium Earth orbit (MEO), also known as an intermediate circular orbit: geocentric orbits ranging in altitude from 2 000 kilometres to just below geosynchronous orbit at 35 786 kilometres. The most common use for satellites in this region is for navigation, communication, and geodetic/space environment science. The most common altitude is approximately 20 000 kilometres which yields an orbital period of twelve hours. 3) Geosynchronous orbit (GSO) and geostationary orbit (GEO) are orbits around Earth at an altitude of 35 786 kilometres matching Earth’s sidereal rotation period. All geosynchronous and geostationary orbits have a semi-major axis of 42 164 kilometres. A geostationary orbit stays exactly above the equator, whereas a geosynchronous orbit may swing north and south to cover more of the Earth’s surface. Communications satellites and weather satellites are often placed in geostationary orbits, so that the satellite antennae (located on Earth) that communicate with them do not have to rotate to track them, but can be pointed permanently at the position in the sky where the satellites are located. 4) High Earth orbit: geocentric orbits above the altitude of 35 786 kilometres. The competing forces of gravity, which is stronger at the lower end, and the outward/upward centrifugal force, which is stronger at the upper end, would result in the cable being held up, under tension, and stationary over a single position on Earth. With the tether deployed, climbers could repeatedly climb the tether to space by mechanical means, releasing their cargo to orbit. Climbers could also descend the tether to return cargo to the surface from orbit.

**Yes debris–things like paint flicking off, launches associated with it and the dust left off, etc prove that there is a risk of space debris–shifting out proves our link on spec**

**Private Companies are pursuing Space Elevators**

**Alfano 15** Andrea Alfano 8-18-2015 “All Of These Companies Are Working On A Space Elevator”<https://www.techtimes.com/articles/77612/20150818/companies-working-space-elevator.htm> (Writer at the Tech Times)//Elmer

Space elevators are solid proof that any mundane object sounds way cooler if you stick the word "space" in front of it. But there's much more than coolness at stake when building a space elevator – this technology has the potential to revolutionize space transportation, and the Canadian private space company Thoth Technology that was recently awarded a patent for its space elevator design isn't the only company in the game. One of the other major players is a U.S.-based company called LiftPort Group, founded by space entrepreneur Michael Laine in 2003. Its plan for a space elevator is vastly different from the one for which Thoth received a patent, however. Whereas Thoth's plans entail tethering a 12-mile-high inflatable space elevator to the Earth, LiftPort is shooting for the moon. Originally, LiftPort had planned to build an Earth elevator, too, but it abandoned the idea in 2007 in favor of building a lunar elevator. The basic design for a lunar elevator is an anchor in the moon that is attached to a cable that extends to a space station situated at a very special point. Known as a Lagrange Point, this is the gravitational tipping point between the Earth and the moon, where their gravitational pulls essentially cancel one another out. A robot could then travel up and down the tether, ferrying cargo between the moon and the station. Out farther in space, a counterweight would balance out the system. Both types of space elevator are intended to increase space access, but in very different ways. Thoth's Earth elevator aims to make launches easier by starting off 12 miles above the Earth's surface. LiftPort's space elevator aims to increase access to the moon in particular, because it is much easier to launch a rocket to the Lagrange Point and dock it at a space station than it is to get to the moon directly. There's a third major company based in Japan called Obayashi Corp. whose plans look like a hybrid of Thoth's and LiftPort's. Obayashi is not a space company, however – it's actually a construction company. Like Thoth, Obayashi plans to build an Earth elevator. But its Earth elevator would consist of a cable tethered to the blue planet, a robotic cargo-carrier, a space station, and a counterweight. It essentially looks like LiftPort's plans, but stuck to the Earth instead of to the moon.

**Yes Space Elevators – NASA confirms.**

**Snowden 18** Scott Snowden 10-2-2018 "A colossal elevator to space could be going up sooner than you ever imagined"<https://www.nbcnews.com/mach/science/colossal-elevator-space-could-be-going-sooner-you-ever-imagined-ncna915421> (Scott has written about science and technology for 20 years for publications around the world. He covers environmental technology for Forbes.)//Elmer

For more than half a century, rockets have been the only way to go to space. But in the not-too-distant future, we may have another option for sending up people and payloads: a colossal elevator extending from Earth’s surface up to an altitude of 22,000 miles, where geosynchronous satellites orbit. NASA says the basic concept of a space elevator is sound, and researchers around the world are optimistic that one can be built. The Obayashi Corp., a global construction firm based in Tokyo, has said it will build one by 2050, and China wants to build one as soon as 2045. Now an experiment to be conducted soon aboard the International Space Station will help determine the real-world feasibility of a space elevator. “The space elevator is the Holy Grail of space exploration,” says Michio Kaku, a professor of physics at City College of New York and a noted futurist. “Imagine pushing the ‘up’ button of an elevator and taking a ride into the heavens. It could open up space to the average person.”

**Regardless of completion, Elevators spur investment in Nanotechnology**

Liam **O’Brien 16**. University of Wollongong. 07/2016. “Nanotechnology in Space.” Young Scientists Journal; Canterbury, no. 19, p. 22.

Nanotechnology is at the forefront of scientific development, continuing to astound and innovate. Likewise, the space industry is rapidly increasing in sophistication and competition, with companies such as SpaceX, Blue Origin and Virgin Galactic becoming increasingly prevalent in what could become a new commercial space race. The various space programs over the past 60 years have led to a multitude of beneficial impacts for everyday society. Nanotechnology, through research and development in space has the potential to do the same. Potential applications of nanotechnology in space are numerous, many of them have the potential to capture and inspire generations to come. One of these applications is the space elevator. By using carbon nanotubes, a super light yet strong material, this concept would be an actual physical structure from the surface of the Earth to an altitude of approximately 36 000 km. The tallest building in the world would fit into this elevator over 42 000 times. The counterweight, used to keep the elevator taught, is proposed to be an asteroid. This would need to be at a distance of 100 000 km, a quarter of the distance to the moon. The benefits of such a structure would be enormous. 95% of a space shuttle's weight at take-off is fuel, costing US$ 20 000 per kilogram to send something into space. However, with a space elevator the cost per kilogram can be reduced to as little as US$ 200. Exploration to other planets can begin at the tower, and travel to and from the moon could become as simple as a morning commute to work. Solar sails provide the means to travel large distances and incredible speeds. Much like sails on a boat use wind, the solar sail uses light as a source of propulsion. Ideally these sails would be kilometres in length and only a few micrometres in thickness. This provides us with the ability to travel at speeds previously unheard of. Using carbon nanotubes once again, a solar sail has the capability to travel at 39 756 km/s which is 13% of the speed of light! This sail could reach Pluto in an astonishing 1.7 days, and Alpha Centauri in just 32 years. Space travel to other planets, other stars, could be possible with solar sails. The Planetary Society is funding for a space sail of itself, and has successfully launched one into orbit. NASA has also sent a sail into orbit, allowing it to burn up in the atmosphere after 240 days. Investing time and resources into nanotechnology for space exploration has benefits for society today. Materials such as graphene are being used in modern manufacturing at an increasing rate as the applications become utilised. Carbon nanotubes will change the way we think about materials and their strength. These nanotubes have a tensile strength one hundred times that of steel, yet are only a sixth of the weight. Imagine light weight vehicles using less petrol and energy as well as being just as strong as regular vehicles. With potentials to revolutionize the way we think about space travel, nanotechnology has a bright future. As a new field of science, it has the capability to push the human race to the outer reaches of our galaxy and hopefully one day to other stars. It will inspire generations of explorers and dreamers to challenge themselves and advance the human race into the next era. As Richard Feynman said in his 1959 talk 'There's Plenty of Room at the Bottom' "A field in which little has been done, but in which an enormous amount can be done. There is still plenty more to achieve.

**Nano tech solves warming**

Bhavya **Khullar**. September 4, 20**17**. Nanomaterials Could Combat Climate Change and Reduce Pollution. https://www.scientificamerican.com/article/nanomaterials-could-combat-climate-change-and-reduce-pollution/

The list of environmental problems that the world faces may be huge, but some strategies for solving them are remarkably small. First explored for applications in microscopy and computing, nanomaterials—materials made up of units that are each thousands of times smaller than the thickness of a human hair—are emerging as useful for tackling threats to our planet’s well-being. Scientists across the globe are developing nanomaterials that can efficiently use carbon dioxide from the air, capture toxic pollutants from water and degrade solid waste into useful products. “Nanomaterials could help us mitigate pollution. They are efficient catalysts and mostly recyclable. Now, they have to become economical for commercialization and better to replace present-day technologies completely,” says [Arun Chattopadhyay](http://www.iitg.ac.in/arun/), a member of the chemistry faculty at the Center for Nanotechnology, Indian Institute of Technology Guwahati. To help slow the climate-changing rise in atmospheric CO2levels, researchers have developed nanoCO2 harvesters that can suck atmospheric carbon dioxide and deploy it for industrial purposes. “Nanomaterials can convert carbon dioxide into useful products like alcohol. The materials could be simple chemical catalysts or photochemical in nature that work in the presence of sunlight,” says Chattopadhyay, who has been working with nanomaterials to tackle environmental pollutants for more than a decade. Many research groups are working to address a problem that, if solved, could be a holy grail in combating climate change: how to pull CO2 out of the atmosphere and convert it into useful products. Chattopadhyay isn’t alone. Many research groups are working to address a problem that, if solved, could be a holy grail in combating climate change: how to pull CO2 out of the atmosphere and convert it into useful products. Nanoparticles offer a promising approach to this because they have a large surface-area-to-volume ratio for interacting with CO2 and properties that allow them to facilitate the conversion of CO2into other things. The challenge is to make them economically viable. Researchers have tried everything from metallic to carbon-based nanoparticles to reduce the cost, but so far they haven’t become efficient enough for industrial-scale application. One of the most recent points of progress in this area is work by scientists at the CSIR-Indian Institute of Petroleum and the Lille University of Science and Technology in France. The researchers developed a nanoCO2 harvester that uses water and sunlight to convert atmospheric CO2 into methanol, which can be employed as an engine fuel, a solvent, an antifreeze agent and a diluent of ethanol. Made by wrapping a layer of modified graphene oxide around spheres of copper zinc oxide and magnetite, the material looks like a miniature golf ball, captures CO2 more efficiently than conventional catalysts and can be readily reused, according to Suman Jain, senior scientist of the Indian Institute of Petroleum, Dehradun in India, who developed the nanoCO2harvester. Jain says that the nanoCO2 harvester has a large molecular surface area and captures more CO2 than a conventional catalyst with similar surface area would, which makes the conversion more efficient. But due to their small size, the nanoparticles have a tendency to clump up, making them inactive with prolonged use. Jain adds that synthesizing useful nanoparticle-based materials is also challenging because it’s hard to make the particles a consistent size. Chattopadhyay says the efficiency of such materials can be improved further, providing hope for useful application in the future. CLEANSING WATER Most toxic dyes used in textile and leather industries can be captured with nanoparticles. “Water pollutants such as dyes from human-created waste like those from tanneries could get to natural sources of water like deep tube wells or groundwater if wastewater from these industries is left untreated,” says Chattopadhyay. “This problem is rather difficult to solve.” An international group of researchers led by professor Elzbieta Megiel of the University of Warsaw in Poland reports that nanomaterials have been widely studied for removing heavy metals and dyes from wastewater. According to the research team, adsorption processes using materials containing magnetic nanoparticles are highly effective and can be easily performed because such nanoparticles have a large number of sites on their surface that can capture pollutants and don’t readily degrade in water. Chattopadhyay adds that appropriately designed magnetic nanomaterials can be used to separate pollutants such as arsenic, lead, chromium and mercury from water. However, the nanotech-based approach has to be more efficient than conventional water purification technology to make it worthwhile. In addition to removing dyes and metals, nanomaterials can also be used to clean up oil spills. Researchers led by Pulickel Ajayan at Rice University in Houston, Texas, have developed a reusable nanosponge that can remove oil from contaminated seawater.