

Editor's Choice



Members of the Swiss Young Socialists (JUSO) demonstrate against the World Economic Forum (WEF) during the annual meeting in Davos, Switzerland, January 24, 2019. REUTERS/Arnd Wiegmann



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Austrian Chancellor Sebastian Kurz attends the World Economic Forum (WEF) annual meeting in Davos, Switzerland, January 24, 2019. REUTERS/Arnd Wiegmann



Mary Callahan Erdoes, Chief Executive Officer of J.P. Morgan Asset & Wealth Management, attends the World Economic Forum (WEF) annual meeting in Davos, Switzerland, January 24, 2019. REUTERS/Arnd Wiegmann



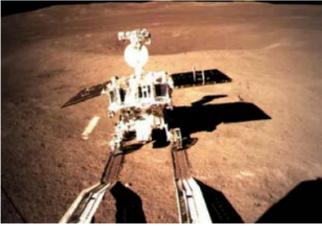
FILE PHOTO: Used plastic bottles are seen at a waste collection point in Tokyo



Italy's Prime Minister Giuseppe Conte speaks to the media during the World Economic Forum (WEF) annual meeting in Davos, Switzerland, January 23, 2019. REUTERS/Arnd Wiegmann



Italy's Prime Minister Giuseppe Conte talks during the World Economic Forum (WEF) annual meeting in Davos, Switzerland, January 23, 2019. REUTERS/Arnd Wiegmann



China's Chang'e 4 Spacecraft On The Far Side Of The Moon.
China has confirmed a small green shoot is growing on the moon, as data is exchanged with Nasa following a recent mission to land a spacecraft.

The Chinese space agency has said NASA shared information about its lunar orbiter satellite in the hopes of monitoring the landing of the Chang'e 4 spacecraft.

And it has now been revealed a sprout has emerged from a lattice-like structure inside a canister after the lander touched down in early January.

"This is the first time humans have done biological growth experiments on the lunar surface," said Xie Gengxin, who led the design of the experiment.

Scientists now hope both plants will root and sprout in the container, producing the first flower ever grown on the moon.

They hope to see the results towards the end of a 100-day experimental period.

Sprout has emerging from a lattice-like structure inside a canister after China's Chang'e 4 Spacecraft touched down in early January on the far side of the moon.

The expedition is the first such collaboration since an American law banned joint space projects with China that do not have prior congressional approval.

The space agency's deputy director Wu Yanhua said NASA shared information about its lunar orbiter satellite in the hopes of monitoring the landing of the Chang'e 4 spacecraft, which made China the first country to land on the far side of the moon earlier this month.

China in turn shared the time and co-ordinates of Chang'e 4's scheduled landing, Mr Wu told reporters during a briefing on the lunar mission.

He added that while Nasa's satellite did not catch the precise moment of landing, it took photographs of the area afterwards.

The state-run China Daily said it was the first

China Confirms That A Small Green Shoot Is Growing On The Moon

China Grows First Plants On The Moon Sparking Hopes For 'Alien Farmers'

Compiled And Edited By John T. Robbins, Southern Daily Editor

such form of co-operation since the 2011 US law was enacted.

The lunar mission by Chang'e 4 and its rover, Jade Rabbit 2, was a triumph for China's growing space programme, which has been rapidly catching up with those of Russia and the US.

President Xi Jinping has placed space exploration among the country's national development priorities and the far side mission offered a chance for China to do something not done before by any other country.



The far side of the moon - the side which faces away from Earth - posed a challenge for scientists because it is beyond radio signals' reach.

China set up a relay satellite in May to receive communication from Chang'e 4.

Bring Back Samples

"In the past, we were always rushing to catch up to the advanced global standards" in space, said Wu Weiren, the chief designer of China's lunar exploration project.

"There were many things to catch up on, and fewer things in which we could surpass others," he said.

"With the probe of the far side of the moon this time, Chinese people have done very well."

Officials at the briefing declined to give specific figures on the costs of the space programme.

Wu Yanhua said the Chang'e 4 was originally built as a "backup product" for Chang'e 3. He said the spending needed to refit it for its new objective was akin to repairing a short section of subway line. (Courtesy <https://www.walesonline.co.uk>)

Related Space Farming

Space farming refers to the cultivation of

crops for food and other materials in space or on off-Earth celestial objects – equivalent to agriculture on Earth. Farming on celestial bodies, such as the Moon or Mars, shares many similarities with farming on a space station or space colony. Wiki

Farming on celestial bodies, such as the Moon or Mars, shares many similarities with farming on a space station or space colony. But, depending on the size of the celestial body, may lack the complexity of micro-gravity found in the latter. Each environment would have differences in the availability of inputs to the space agriculture process: inorganic material needed for plant growth, soil media, insolation, relative availability of carbon dioxide, nitrogen and oxygen, and so forth.

Introduction
Supply of food to space stations and other long duration missions is heavy and staggeringly expensive. One astronaut on the International Space Station requires approximately "1.8 kilograms of food and packaging per day".[1] For a long-term mission, such as a four-man crew, three year Martian mission, this number can grow to as much as 24,000 pounds.[1]

Due to the cost of resupply and the impracticality of resupplying interplanetary missions the prospect of growing food inflight is incredibly appealing. The existence of a space farm would aid the creation of a sustainable environment, as plants can be used to recycle wastewater, generate oxygen, continuously purify the air and recycle faeces on the space station or spaceship. Just 10m² of crops produces 25% of the daily requirements of 1 person, or about 180-210grams of oxygen.

[2] This essentially allows the space farm to turn the spaceship into an artificial ecosystem with a hydrological cycle and nutrient recycling.[3][4]

Zucchini plant in the Destiny lab

In addition to maintaining a shelf-life and reducing total

mass, the ability to grow food in space would help reduce the vitamin gap in astronaut's diets and provide fresh food with improved taste and texture. Currently, much of the food supplied to astronauts is heat treated or freeze dried. Both of these methods, for the most part, retain the properties of the food pre-treatment. However, vitamin degradation during storage can occur. A 2009 study noted significant decreases in vitamins A, C and K as well as folic acid and thiamin can occur in as little as one year of storage. A mission to Mars could require food storage for as long as five years, thus a new source of these vitamins would be required.

Supply of foodstuffs to others is likely to be a major part of early off-Earth settlements. Food production is a non-trivial task and is likely to be one of the most labor-intensive, and vital, tasks of early colonists. Among others, NASA is researching how to accomplish space farming.

Technical Challenges

A variety of technical challenges will face colonists who attempt to do off-Earth agriculture. These include the effect of reduced gravity, lighting, and pressure as well as increased radiation.[5] Though greenhouses may solve many of the problems presented in space, their construction would come with their own set of technical challenges.

Plants grown inflight experience a micro-gravity environment, and plants grown on the surface of Mars experience approximately 1/3 the gravity that earth plants do. However, so long as plants are provided with directional light, those grown in low gravity environments still experienced normal growth. Normal growth is classified as opposite root and shoot growth direction. This being said many plants grown in a space flight environment have been significantly smaller than those grown on earth's surface and grew at a slower rate.

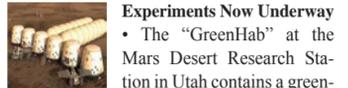
Advanced Astroculture soybean plant growth experiment.

In addition to varying effects of gravity, unless protected, plants

grown on the surface of Mars will be exposed to much higher levels of radiation than on Earth. Exposure to high levels of radiation can damage plant DNA. This occurs as highly reactive hydroxyl radicals target DNA. DNA degradation has a direct effect on plant germination, growth and reproduction. Ionizing radiation also has an effect on PSII function and may cause a loss of function and generation of radicals responsible for photo-oxidation. The intensity of these

effects vary from species to species. The low-pressure environment of the surface of Mars has also been a cause for concern. Hypobaric conditions can affect net photosynthesis and evapotranspiration rates. However, a 2006 study suggests maintaining elevated CO2 concentrations can mitigate the effects of hypobaric conditions as low as 10 kPa to achieve normal plant growth.

Martian soil contains a majority of the minerals needed for plant growth except for reactive nitrogen, which is a product of mineralization of organic matter. Since there is a lack of organic matter on the surface of mars, there is a lack of this component. Reactive nitrogen is a required constituent of soil used for plant growth, and it is possible that nitrogen fixing species, such as bacteria, could aide in the lack of reactive nitrogen series. However, a 2014 study suggested that plants were able to germinate and survive a period of 50 days on a Martian and lunar soil by using simulant soils. This being said, only one of their four experimented species did well enough to achieve full flower formation and more work would need to be done to achieve complete growth.



Experiments Now Underway
• The "GreenHab" at the Mars Desert Research Station in Utah contains a greenhouse which is designed to emulate some of the challenges resulting from farming on Mars.

• The Lada experiment and the European Modular Cultivation System on the International Space Station is used to grow small amounts of fresh food.

• In 2013, NASA funded research to develop a 3D food printer.

• The NASA Vegetable Production System, "Veggie", is a deployable unit which aims to produce salad type crops aboard the International Space Station.

• The 2019 lunar lander Chang'e 4 carries the Lunar Micro Ecosystem, a 3 kg (6.6 lb) sealed "biosphere" cylinder 18 cm long and 16 cm in diameter with seeds and insect eggs to test whether plants and insects could hatch and grow together in synergy.

• The future ALINA lunar lander will carry a small "biosphere" cylinder called Lunar Plant Growth Experiment (LPX), where NASA will attempt to germinate and grow several plant types.

Crops Being Experimented With

The following crops have been considered for use in space farms:[potatoes, grains, rice, beans, tomatoes, paprika, lettuce, cabbage, strawberry, onions and peppers. (Courtesy Wikipedia, the free encyclopedia)

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As unemployment filings among furloughed federal employees doubled last week across Maryland, Virginia and Washington, D.C., the effects on government contractors are beginning to take shape.

The shutdown is costing contractors an estimated \$1.5 billion per week and companies that primarily serve the government have already hemorrhaged "tens of thousands of people," according to David Berteau, who represents hundreds of companies as head of the Professional Services Council.

Those unemployed government contractors are likely to join the 9,000 furloughed federal employees added to unemployment rolls in the capital region during the week of Jan. 5, Berteau said.

"We have tens of thousands of people laid off or not working in the nine cabinet agencies and other agencies shut down," Berteau said on a call with reporters Thursday. "Contractors are feeling more and more impact. Each day, we're getting notices of stop-work orders from our member companies."

Berteau said the shutdown's employment and financial impacts will likely compound as it lingers on.

The government is stopping contracts daily across the Treasury, Agriculture, Homeland Security, Interior, State, Housing and Urban Development, Transportation, Commerce and Justice departments, as well as other agencies including NASA. In fiscal 2018, services contracts at those agencies—the contracts most likely to be halted due to lack of appropriated money—were valued at more than \$70 billion.

Berteau said there are about 1 million government contractors that do everything from answer phones in call centers to analyze classified intelligence information. Unlike furloughed federal employees, who President Trump ensured will receive back pay with a bill signing Wednesday, the majority of contractors will receive no back pay. "We've heard from a number of companies facing a tough dilemma, 'Do I get rid of employees and save money or get rid of money to save employees and go out of business?'" Berteau said. "If this continues a lot longer, we'll see a lot of companies shut their doors because they don't have a line of credit available."



Tens of Thousands' Of Government Contractors Laid Off Due To Shutdown



More than two dozen federal employees and supporters demonstrate at the Sacramento International Airport calling for lawmakers to end the partial government shutdown. (Photo/AP)

OVERVIEW

The prolonged government shutdown is getting "pretty scary" as the number of federal employees and contractors forced out of work could impact the nation's next jobs report.

Compiled And Edited By John T. Robbins, Southern Daily Editor

Berteau said the effects from this extended shutdown are unlike previous shutdowns. He said some PSC member companies "have submitted invoices before the government shut down that haven't been paid."

SAIC, a large defense and tech contractor, publicly stated it hadn't been paid by the government for as much as \$50 million in work performed and is spending \$10 million per week to pay staffers that would otherwise be furloughed. Berteau said in many cases contractors are unable to reach government contracting officers by phone or email regarding pending acquisitions because the government personnel or offices are furloughed.

The shutdown's effects are likely to worsen exponentially, Berteau said. He predicted another doubling of the number of furloughed federal employees filing for unemployment "to 20,000 or 30,000" for the week ending Jan. 12, which is "getting close to" a number that could impact the nation's monthly jobs report expected from the Bureau of Labor Statistics on Feb. 1.

There's also the question of how federal employees and government contractors will return to their original jobs when the government reopens. The longer the shutdown lasts, the more likely it is people will seek employment elsewhere. Last week, nearly 800,000 feds missed a paycheck.

"At some point, people are going to get another job. The magnitude of this restart is going to be harder this time than in previous shutdowns," Berteau said. "How long can people

work without getting paid? That's a question we've never tested to this level before. It's pretty scary."

Related

How the Shutdown Could Hurt Government's IT Recruitment Furloughed agencies are missing out on peak recruiting season for recent and soon-to-be college grads

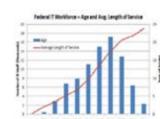
The current government shutdown is expected to exacerbate the brain drain facing the government as the IT workforce grows older and agencies struggle to bring on the next generation of tech talent, according to federal tech experts.

Agencies are shuttered right in the middle of recruitment season for the next batch of computer science and engineering graduates, which means they can't attend job fairs and campus events to scoop up the best and brightest. And as demand for private sector techies grows and a sizable chunk of the government's tech workforce nears retirement, the shutdown could also push many current feds to seek greener pastures.

The impact would likely be greatest among the most high-skilled employees and potential new hires, who have a plethora of job opportunities outside government, said Dave Mihelcic, the former chief technology officer at the Defense Information Systems Agency. As the shutdown strips away many of the perks that attract people to civil service, private sector jobs will look more enticing for the most

talented technologists.

"It's difficult to anticipate a career at a place that you see going through these kinds of machinations," Mihelcic, who currently serves as federal chief technology and strategy officer for Juniper Networks, told Nextgov. "If this shutdown goes for much longer, you could see some of those best, most employable [people] fleeing."



The Homeland Security Department has historically led civilian agencies in attracting young tech employees, and in an October interview, Chief Human Capital Officer Angela Bailey attributed the agency's success to its ability to sell the mission, partly through in-person events like hiring fairs.

But with funds cut off, the agency can't host or attend any of those events. The office that oversees hiring efforts—the Homeland Security Management Directorate—also furloughed nearly 90 percent of employees during the shutdown, which means it's unlikely the agency is even processing applications. The shutdown comes during "prime hiring season" for recent and soon-to-be graduates, Mihelcic said, so affected agencies won't get a chance to pitch themselves to top candidates.

But beyond agencies' absence from recruitment events, the more lasting damage could come from the shutdown's effect on the image of government, Mihelcic said. Federal jobs typically offer a level of job security that's hard to find in the private sector, but as some 800,000 employees go weeks without pay, that notion is being flipped on its head, he said.

As a result, recent grads and technologists that might otherwise consider careers in government won't see the same incentives that attracted civil servants in the past.

"There just will be a more negative perception of the stability and security and viability of a career in the federal government coming out of this shutdown," even for agencies that remained open, he said.

Mihelcic weathered numerous shutdowns during his three decades in civil service, but he said each one resulted in a "palpable" drop in employee morale. While he himself was never inclined to leave government due to shutdowns, he said many of his colleagues were.

Employees currently furloughed or working without pay could start to see their jobs in less positive light as paychecks stop and federal leaders politicize the workforce, Mihelcic

said. As the shutdown stretches into its fifth week, some tech workers could begin pursuing higher paying jobs in industry, or retiring altogether.

And if people wanted to leave, they'd have lots of places to go.

There's a severe shortage of tech and cyber talent in the U.S. job market, so many firms would pay top dollar for the highly trained specialists coming out of agencies like Homeland Security. Margot Conrad, director of federal workforce programs at the Partnership for Public Service, said those positions could become more enticing if feds don't feel like their current work is being appreciated by the American people or government leaders.

The 2013 government shutdown had no appreciable impact on the number of people entering or leaving government, according to data from the Office of Personnel Management. But there's evidence it could be different this time around.

For one, the 2013 shutdown lasted only 16 days, while the most recent funding lapse has continued past the 27-day mark with no end in sight. Today's federal tech workforce is also older than it was in 2013, meaning more people have the option to retire if the shutdown drags on.

That said, Conrad and Mihelcic both agreed the shutdown could result more in problems of employee quality than quantity. There will always be a pool of people looking to work for government, but the current situation could deter the most talented people from either joining civil service or staying on for the long haul.

"If you're a highly qualified person in the tech field or the cyber field, you've got a lot of employers out there that are looking to scoop you up," Conrad told Nextgov. "Government has to really work to compete for that talent."

Conrad has long pushed agencies to do a better job marketing their missions as a way to attract young tech talent, and once they reopen their doors, she said they need to double down on those efforts.

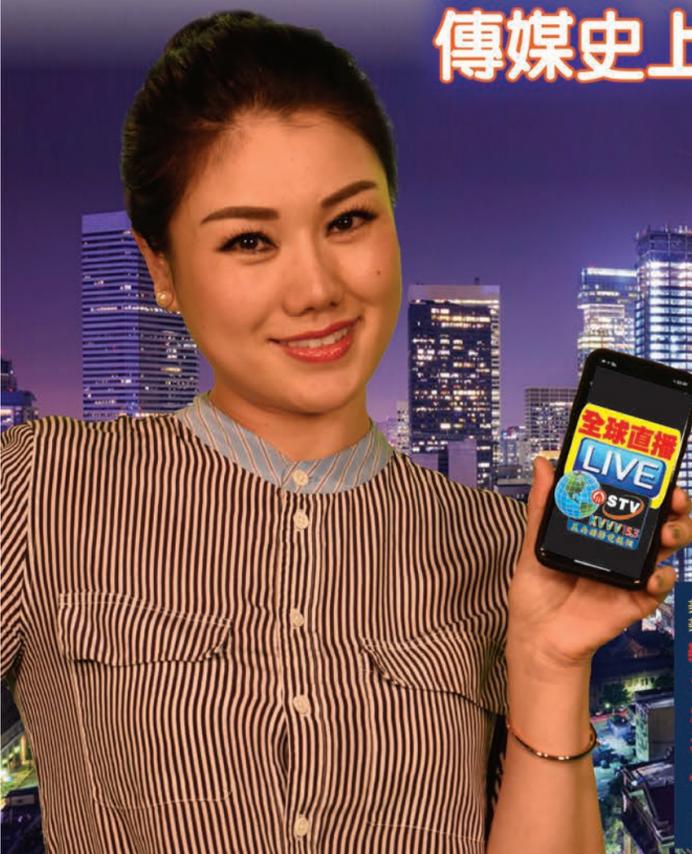
"I do think agencies are really going to be hurting now in terms of recruiting the next generation of talent that [they] desperately need," she said. "Now more than ever they're really going to need to focus ... on building these strategic recruitment plans. Otherwise it's going to be really difficult for them to rebound from this setback." (Courtesy nextgov.com)

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