

## Where are the Agencies Human Space Flight (HFR) Programs Heading?

The following little summary tries to collect and compare data available on official and semi-official agency and other internet pages (as of October 2014) to show where the human spaceflight is heading in the future. The summary is by no means complete, however a trend might be detectable: The next two big goals, setting foot on the Moon again and flying astronauts/cosmonauts/taikonauts to Mars and guide them safely down to the surface could only be achieved as an international enterprise.

With respect to the Moon it looks like the race "is on" but nobody participates.

If any of you dear readers have more up-to-date information, please let me know (e-mail: joachimkehr@aol.com).

### USA (NASA)

#### System



#### Description

\* Space Launch System (SLS) Program

\* Payload  
70 t - 130 t to LEO

#### Goal

Objective 1.1: Expand human presence into the solar system and to the surface of Mars to advance exploration, science, innovation, benefits to humanity, and international collaboration.  
(NASA Strategic Plan, 2014)

#### Remarks

NASA's Asteroid Initiative has two main parts: a mission to identify, robotically capture, and redirect a small asteroid into a stable lunar orbit; and a grand challenge to promote global collaboration in finding all asteroid threats to human populations and know what to do about them.

#### Orion



\* Multi-Purpose Crew Vehicle (MPCV) Program  
0 - 6 Crew members

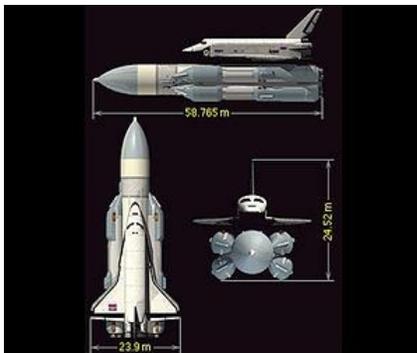
\* ATV-based Service Module  
NASA announced on January 16, 2013, that ESA will construct the service module for Exploration Mission-1 in 2017.

ESA cooperation to deliver the Orion Service Modul based on ESA's ISS cargo carrier ATV (Automated Transfer Vehicle)

"NASA has has been challenged to develop capabilities designed to meet the unique challenges beyond low Earth orbit. These destinations include LaGrange Points, near-Earth asteroids, the Moon and eventually Mars"  
(NASA Strategic Plan, 2014)

### Russia, Roscosmos (RKA)

#### System



Archive [1988] Buran, 100t to LEO on Energia launch vehicle (discontinued).

#### Description

According to Russian media reports, the 2016-25 plan includes funding for a new super heavy booster (80t- 100t to LEO, like the Energia L/V) to support human deep space exploration.

The new carrier rocket Angara is set to become the base for the ambitious project that could bring Russia back to its heyday of space exploration. It could be launched from the Vostochny

Cosmodrome which is now being constructed in Russia's Far East, and will replace Kazakhstan's Baikonur as Russia's main launchpad.

The 2016-25 plan also comprises a Soyuz replacement vehicle capable of carrying cosmonaut to the moon

#### Goal

Having conducted a recent study (known as Magistral) into the launch vehicle with a payload of 75-80 tons and whose "open architecture" would enable to upgrade it later to carry up to 120-130 tons into the low Earth orbit like the Buran launch vehicle was able to. Whether the Russian government would endorse, let alone fund such a plan, remained unclear at the time.

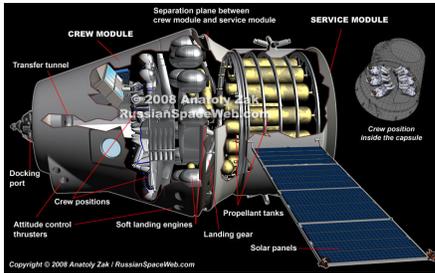
#### Remarks

Test flights for the super heavy booster are planned for the 2028-2030 time frame.  
The heavy-lift vehicle could launch elements for a lunar base which would include habitation, laboratory and power modules.  
Initial work on the Moon base should begin in 2018. Cosmonauts would occupy the lunar base in the early 2030's

and other destinations



Angara L/V family



First of these two variants was a three-module PTK-Z Russia will go to the Moon to STAY! spacecraft. It was designed for long-duration autonomous missions in the Earth orbit, while a two-module PTK-S variant was intended to service the Earth-orbiting station, such as ISS.



In October 2010, Russian space agency, Roskosmos, published its requirements to the industry for the development of the Technical Project of the next-generation spacecraft, PTK NP. The document identified two versions of the spacecraft, which would be a priority for the Technical Project in the next two years.

The PTK-Z would carry a max. crew of 6 cosmonauts

## China Space Agency (CSA)

System

Long March 3B  
Long March 3B

Description

Long March is China's primary expendable launch system family. The [Shenzhou](#) spacecraft and [Chang'e](#) lunar orbiters are also launched on the Long March rocket. The maximum payload for LEO is 12 t (CZ-3B), the maximum payload for GTO is 5,5 t (CZ-3B/E). The next generation rocket – [Long March 5](#) variants will offer more payload in the future.

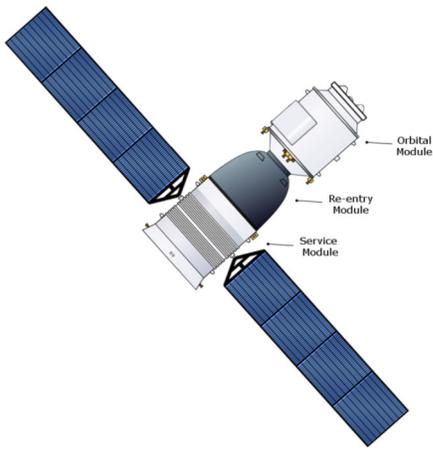
Goal

"From the rule of science and moon probe technology development, a place for long-term residence (on the moon) will be built eventually," added the scientist, who is also a member of the National Committee of the Chinese People's Political Consultative Conference (CPPCC), China's top political advisory body. (March 2014)

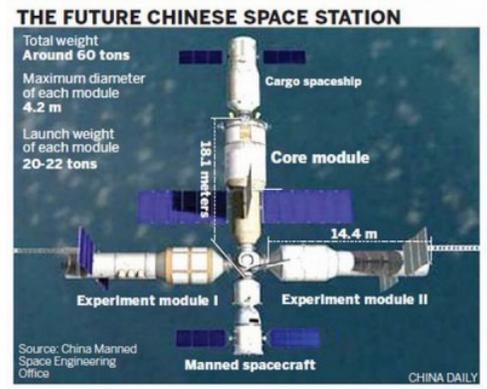
Remarks



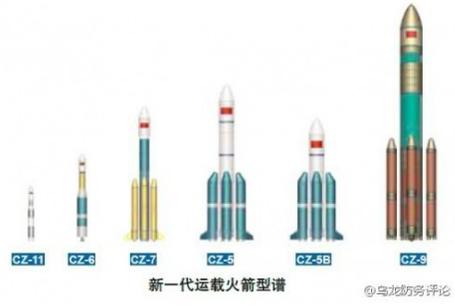
Possible Chinese Moon base (conceptual design proposal)



**Shenzhou 7**  
 Crew space: 3  
 Design life : 20 days  
 Launch mass 7,840 Kg  
 Dimensions 9.25 by 2.8 meters  
 Volume 14.00 cubic meters  
 Regime: Low Earth



The planned Chinese 70 t space station consists of 3 Tiangong-type modules (construction to be completed around 2020).



**Long March 9**  
 (LM-9, CZ-9, or Changzheng 9) is a Chinese super-heavy carrier rocket that is currently in study. It is planned for a maximum payload capacity of at least 130 t to LEO or at least 50 t to Lunar Transfer Orbit.

“They very clearly tout [these missions] as leading up to the fully assembled station by 2022,” he said. “And they are very clear in offering partnerships and user relationships in that space station program”. (Charles Walker, Shuttle Astronaut at ASE congress Oct. 2014).

Long March 9 (=CZ 9) : Right picture

**Indian Space Agency (ISRO)**



**Description**  
 Development for the GSLV Mk III began in the early 2000s, with the first launch planned for 2009-2010.[13] Several factors have delayed the program, including the 15 April 2010 failure of the ISRO-developed cryogenic upper stage on the GSLV Mk II. Planned P/L performance data: 10 t to LEO, 4 t to GTO. The next test is planned for end of 2014

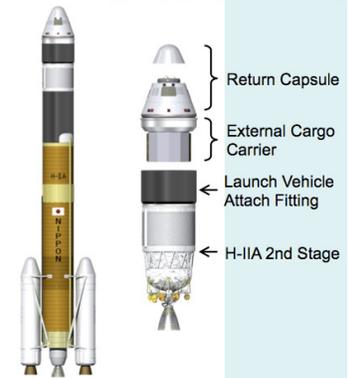
**Goal**  
 The Indian human spaceflight programme is a proposal by the Indian Space Research Organisation (ISRO) to develop and launch the ISRO Orbital Vehicle, which is to carry a two-member crew to Low Earth Orbit. Recent reports indicate that human spaceflight will occur after 2017, on a GSLV-Mk III, as the mission is not included in the government's 12th five-year plan (2012–2017).[1] Since the ISRO does not have a human-rated launch vehicle or the budget from the government to undertake such a flight, it may not happen this decade.

**Remarks**

ISRO crew capsule  
 The first orbital flight is planned to take place in 2016.[16] The first flight with a crew on board would take place after 2020

**Japan (JAXA)**

**System**



H-X and HTV-R

**Description**

While the HTV, and eventually the HTV-R, are launched on the H-IIB rocket, all three of the proposed manned vehicles — the two capsule variants and the mini-shuttle — would be launched by a newly proposed rocket called the H-X.

\* The H-X will be a new design to replace the H-IIA/B launchers with higher reliability for human-rated launches, and it's slated to become operational in the 2020s.

\* GTO performance: 2 t ...6.5 t

**Goal**

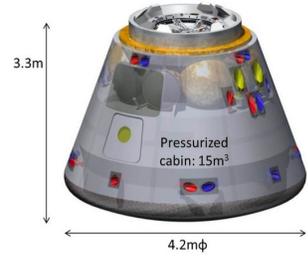
Japanese plans for a manned lunar landing were in development but were shelved in early 2010 due to budget constraints.[23]

In June 2014 Japan's science and technology ministry said it was considering a space mission to **Mars**. In a ministry paper it indicated unmanned exploration, manned missions to Mars and long-term settlement on the **Moon** were objectives, for which international cooperation and support was going to be sought

**Remarks**

As Japan's space policy plans shift away from research and development, the **Japan Aerospace Exploration Agency (JAXA)** is finding its flagship science, technology and manned spaceflight programs in line for cuts and cancellations.

Some or all of Japan's satellites planned for the Global Earth Observation System of Systems (GEOSS), the HTV-R pressurized sample-and-crew-return mini-shuttle, and the H-X/H-3 launcher programs could face cancellation, says JAXA's Hiroshi Sasaki, senior advisor for the strategic planning and management department. (April 2013)

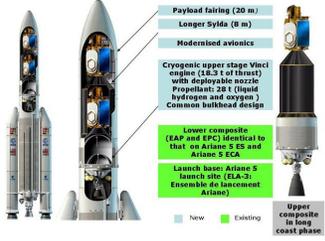


Japan hopes to launch astronauts aboard a manned capsule or space plane by 2022, and the nation is also eyeing point-to-point suborbital transportation over the longer haul.

The capsule or mini-shuttle — which may resemble **Sierra Nevada's Dream Chaser** space plane — would each accommodate a crew of three and carry up to 880 pounds (400 kilograms) of cargo, officials with the Japan Aerospace Exploration Agency (JAXA) said this month.

**Europe (ESA)**

**System**



**Description**

The two Ariane launchers are non-human rated.

\* AR5 ME  
Upper stage  
> CDR: May 2015  
P/L mass: 12 t to GTO

\* AR-6  
> SRR June 2014

P/L mass: 6.5 t to GTO

**Goal**

The HSF goal in the ESA long term schedule is listed as:  
Scheduled Astronaut flights to ISS until 2018, Columbus Ops until 2020

**Remarks**

A decision between AR-5 ME (AR-5 Midlife Extension) and AR-6 is to be expected during the ESA conference on ministerial level in Nov. 2014



**CSA (Canadian Space Agency)**

System

Description

Goal

Remarks



"Canada will continue as an active partner and participant in the International Space Station," the report stated, adding "flight opportunities for Canadian astronauts" would be one of the priorities.

Money available for human space exploration and technology spinoffs, the Canadian Space Agency stated in May 2011 would decline from \$105.9 million (\$106.3 million Canadian) in 2012-13 down to \$92.7 million (\$93 million) in 2014-15. In the same time period.

*October 2014, Joachim J. Kehr Editor SpaceOps News*