

13. Human spaceflight activities

More countries than ever are investing in indigenous human spaceflight capabilities, usually in collaboration, by providing scientific experiments and equipment to larger missions through a variety of means: sounding rockets, suborbital flights, and of course orbital spaceflight missions (currently only available via flights to the International Space Station (ISS) or the Chinese Tiangong-1 test-bed space station).

The year 2014 marks the 16th anniversary of the ISS, with six astronauts continuously on-board since 2008. The countries involved in this partnership include: the United States, Canada, Japan, the Russian Federation, and participating ESA country members (Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom). Since the end of the space shuttle missions in 2011, the only way for crews to reach the station is by using the Russian Soyuz capsules. Other means are available to deliver cargo and crew supplies to the station: the Russian Progress (several flights a year), the European Automated Transfer Vehicle (the fifth to be launched in 2014), the Japanese H-II Transfer Vehicle (also the fifth to be launched in 2014) and commercial US capsules, SpaceX's dragon and Orbital's Cygnus. SpaceX and Orbital were awarded resupply contracts worth USD 1.6 and 1.9 billion respectively until 2015. As of May 2014, SpaceX has successfully executed 3 of its 12 planned cargo missions to the ISS. Orbital Sciences Corporation's Cygnus capsule has made its first delivery in January.

Following the retirement of the space shuttle fleet, commercial firms were selected by NASA to develop new spacecraft capable of carrying astronauts to the ISS by 2017-18. These are SpaceX, Boeing, Sierra Nevada and Blue Origin. In parallel, NASA is working on the development of a new heavy-lift launcher with a capsule dubbed Orion, capable of carrying astronauts beyond the earth's orbit, with long-term missions to asteroids and Mars. China has also started building a 30-ton space station, to be completed in the 2016-23 timeframe. In the meantime, the operational Chinese Tiangong-1 space station serves as a technology testbed, visited in June 2013 by Taikonauts for two weeks, China's longest manned space mission to date.

The shift from government to commercial space transportation for cargo and ultimately crews of astronauts to low-earth orbit will be highly dependent on the performance of firms over the next five years. In parallel to these initiatives, space tourism activities are being developed particularly in North America and Europe, with zero-gravity/parabolic flights, sub-orbital flights and orbital space travel offered to private consumers. The company Virgin Galactic is scheduling its first commercial suborbital flight in 2014-15 from the United States.

Methodological notes

Several definitions of "astronaut" co-exist. The International Aeronautic Federation (IAF) calls anyone who has flown at an altitude of 100 kilometres an "astronaut". The US Air Force set the limit at 50 miles altitude (80.45 km), while other organisations consider that a person must have reached orbital velocity and remain in orbit (above 200 km) to be considered an "astronaut". The IAF definition has been used here.

Sources

European Space Agency (2014), Human spaceflight programme, www.esa.int/Our_Activities/Human_Spaceflight.

Federal Aviation Administration (2014), Office of Commercial Space Transportation, www.faa.gov/about/office_org/headquarters_offices/ast.

NASA (2014), International Space Station, www.nasa.gov/mission_pages/station.

Notes

13.1: 1. China, Russian Federation.

2. 7 Russian, 1 American, 1 Chinese, 1 international.

13.2: 1. Since 2011.

13.1. Selected human spaceflight statistics

As of May 2014

Countries with autonomous capability to launch humans into space	2 ¹
Number of nationalities who have flown in space	+40
Number of launches with humans on-board	+270
Persons who have flown into orbit	+530
Operational and inhabited space stations since the 1960s	10 ²
Professional astronauts living in orbit (the International Space Station is continuously inhabited since 2003)	6
Number of paying orbital spaceflight participants ("space tourism")	7
Persons who have flown over the 100 km altitude threshold (including suborbital flights)	484
Astronauts who walked on the Moon (1969-1972)	12

13.2. Human spaceflight capabilities in selected parts of the world

As of January 2014

		Orbital capabilities			Human-rated launchers capabilities		
		1990-2009	2010-2019	After 2020	1990-2009	2010-2019	After 2020
Government	EUR	Spacelab module on shuttle	ISS	ISS	None	None	None
	CHN	None	Tiangong-1 space station	Tiangong-2 space station	Long March	Long March	Long March
	RUS	Mir	ISS	ISS	Soyuz	Soyuz	Soyuz/Angara
	USA	Space shuttle	ISS	ISS	Space shuttle	None ¹	Commercial/governmental launchers



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