



Space Renaissance 2021 January 31
Orbital & Lunar Industrialisation Webinar

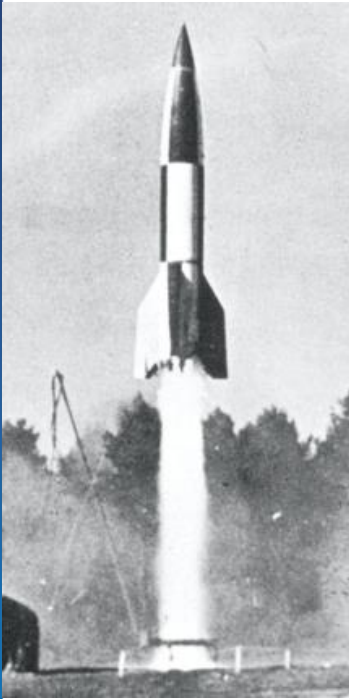
Potential Contribution of Space Tourism

Patrick Collins, PhD

Society for Space Tourism of Japan (SSTJ)

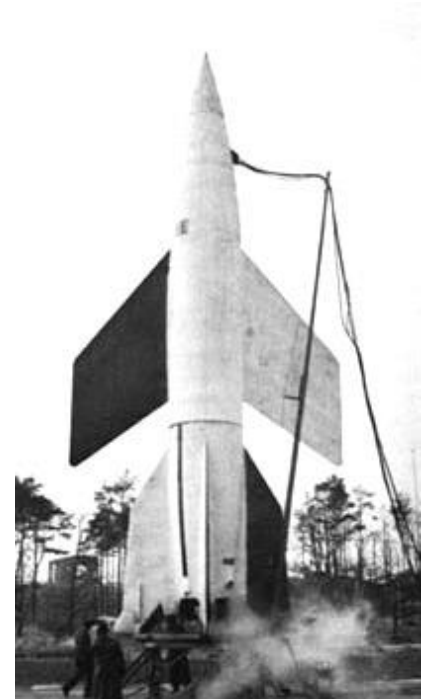


On the evening of October 3, 1942, the German rocket pioneers toasted “Space Travel”, which they planned to start after the war ended.



If sub-orbital space flights had started during the 1950s, orbital services would have started in the 1970s – and we would have already held the first

Lunar Olympics.

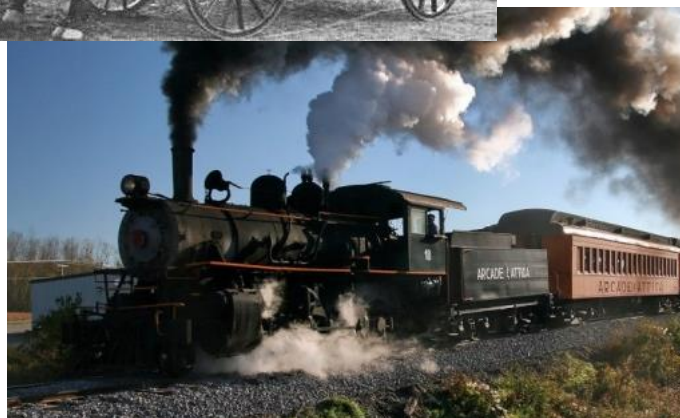




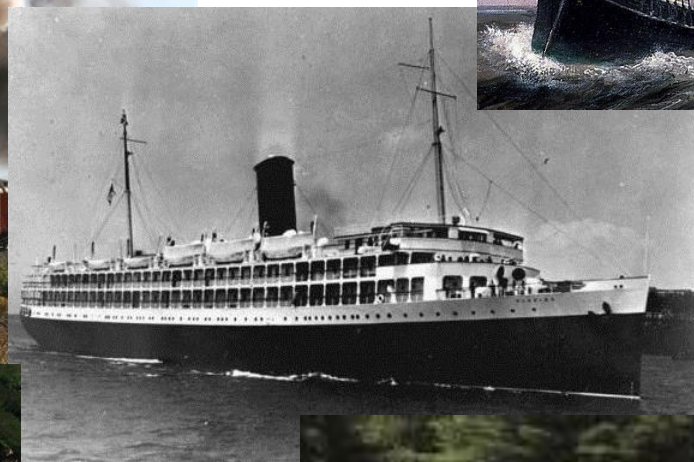
馬車



帆船



汽車



汽船



車

飛行機

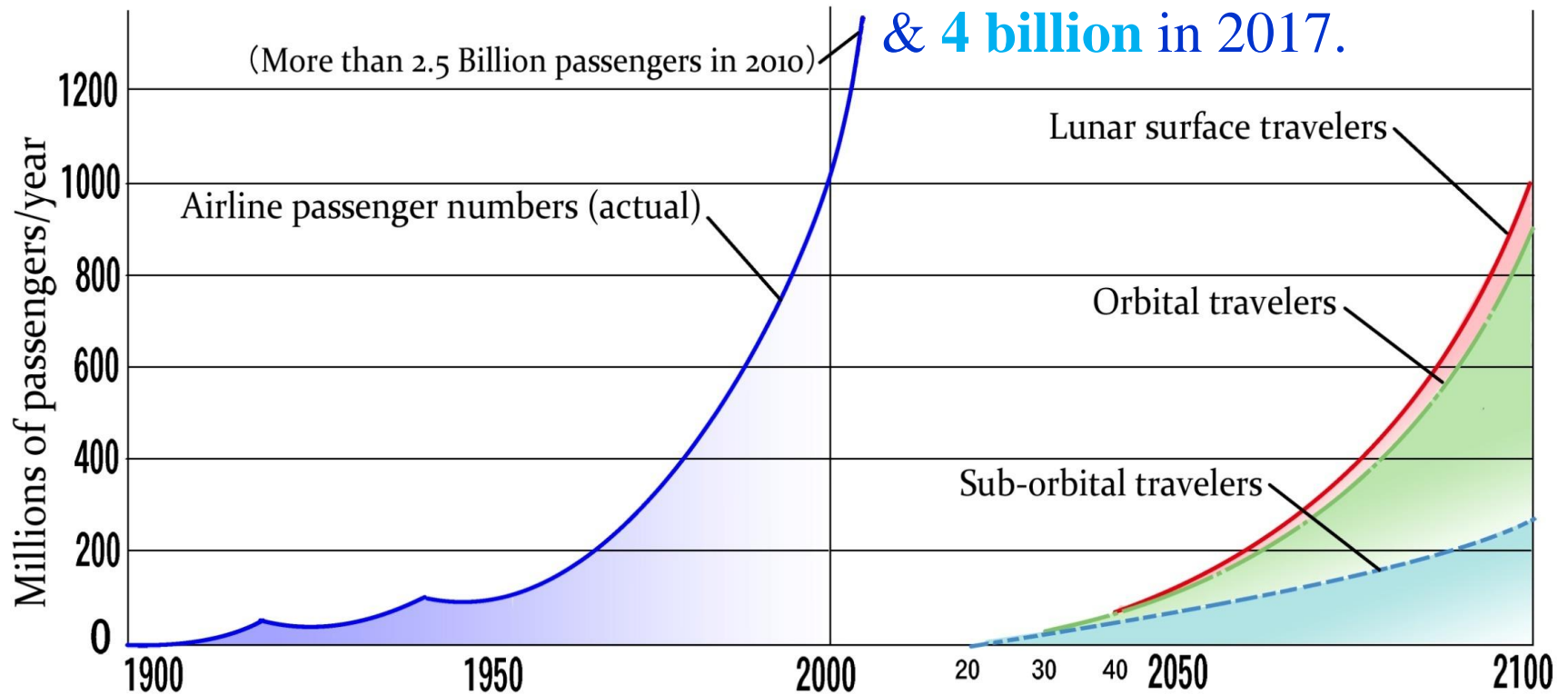




These **6 new transportation systems** each led to innumerable inventions, new services, “spin-off” industries and infrastructure world-wide, which grew for centuries, and **employed hundreds of millions of people.**



Once fully reusable spaceplanes are developed, the price of orbital flights will fall progressively – like air travel.



20th Century Air Travel & 21st Century Space Travel Forecast.

21st Century space travel could grow as big as
20th Century air travel – **through 3 phases.**



The 3 phases of space tourism.

Phase	Year	Travel service	Development /yrs	Investment	Price/person
1	2020s	Sub-orbital	5 – 10 years	100s of \$M	\$ Thousands
2	2030s	Orbital	15 – 20 years	\$ Billions	10s of \$K
3	2040s	Moon surface	25 – 30 years	10s of \$Billions	100s \$K

NB Burt Rutan has predicted that the price of a sub-orbital flight could fall to \$400.



In 2019 Toyota's Deputy CEO **Mr Terada** announced its **Lunar Rover** project with JAXA.
NB Toyota is **100 times** larger than JAXA.



Mr Terada spoke of the excitement among Toyota's engineers about participating in the Lunar Rover project.

“It's our engineers' greatest dream”.





Toyota's cruiser
accommodates a
crew of 2 for 6
weeks.





Solar panels, electric motor, airlock . . . the design is already well advanced.



If operations start in 2029 as planned, lunar construction research will grow through the 2030s.



Toyota is a major designer, producer and marketer of many different vehicles.

It is also a market-driven, customer-focused giant.

It is surely already planning different versions of its lunar cruiser.



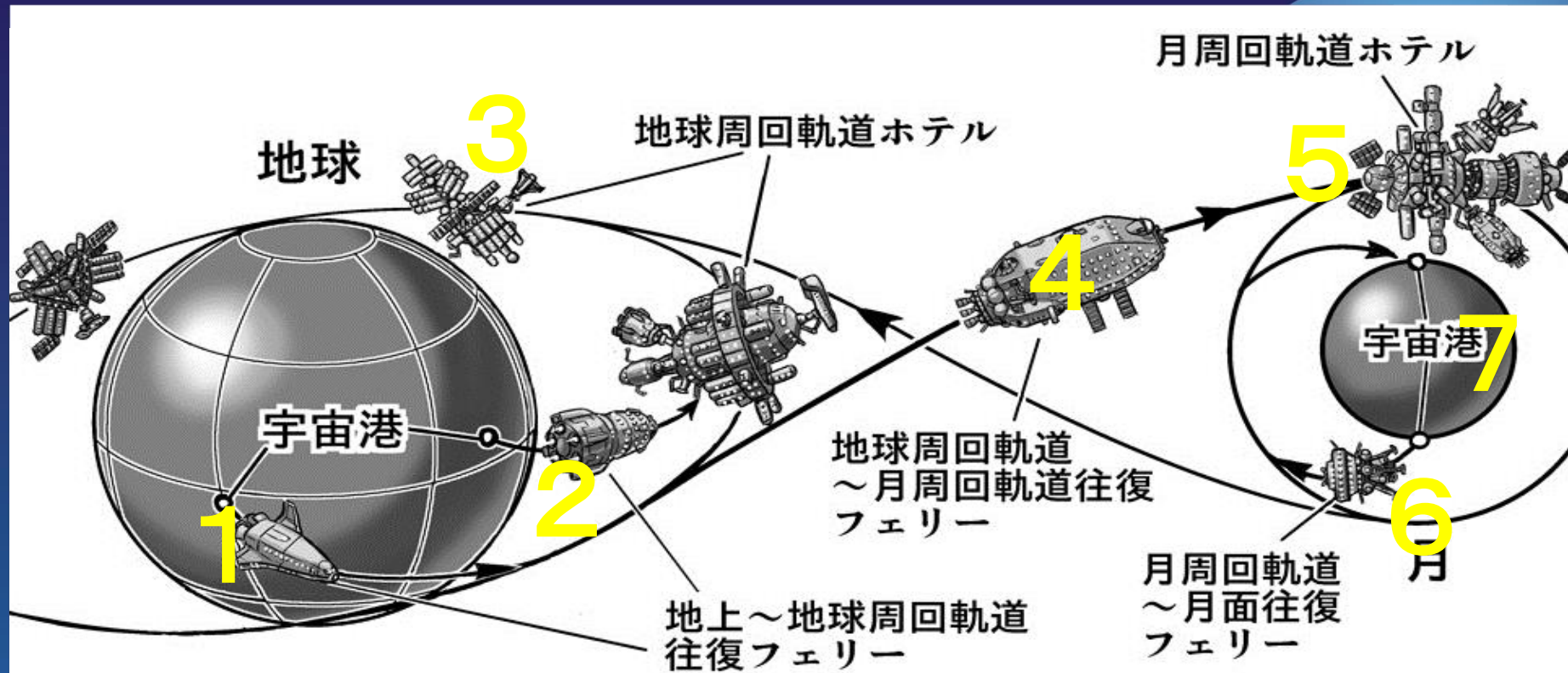
Lunar construction research is the key to building tourism infrastructure.

There will surely be demand from several countries for a **"Moon-Truck"**.



... and then for a “Lunar Tour Bus” 😊



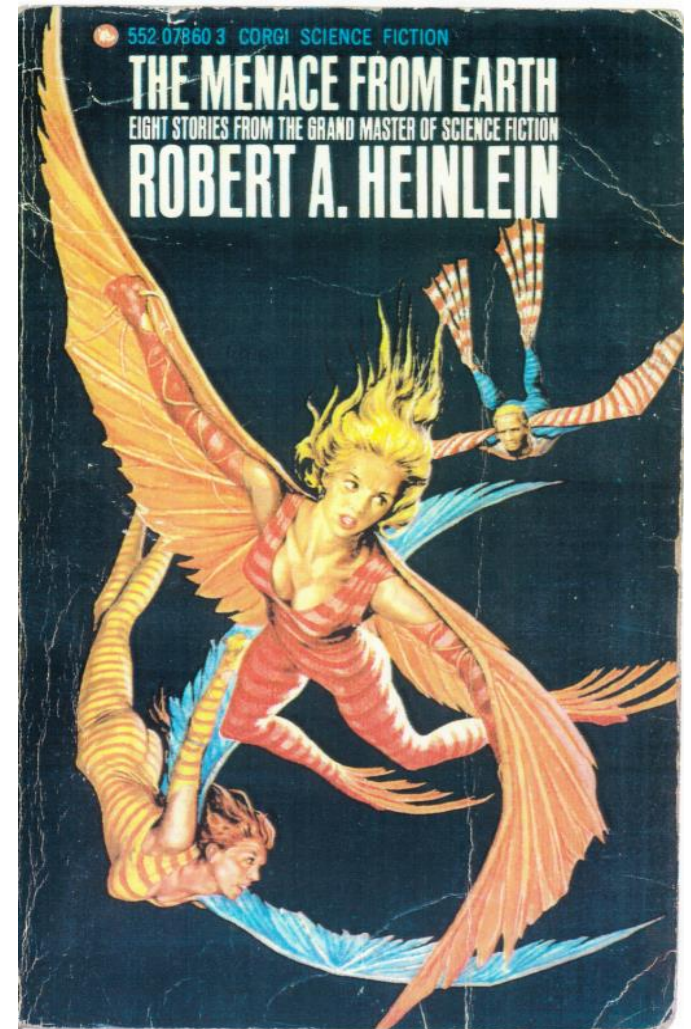


In order for lunar tourism to reach large scale, 7 pieces of transportation infrastructure are needed. There is great scope for international collaboration.



One reason why tourists
will visit the Moon will
surely be for **Low-Gravity
Sports!**

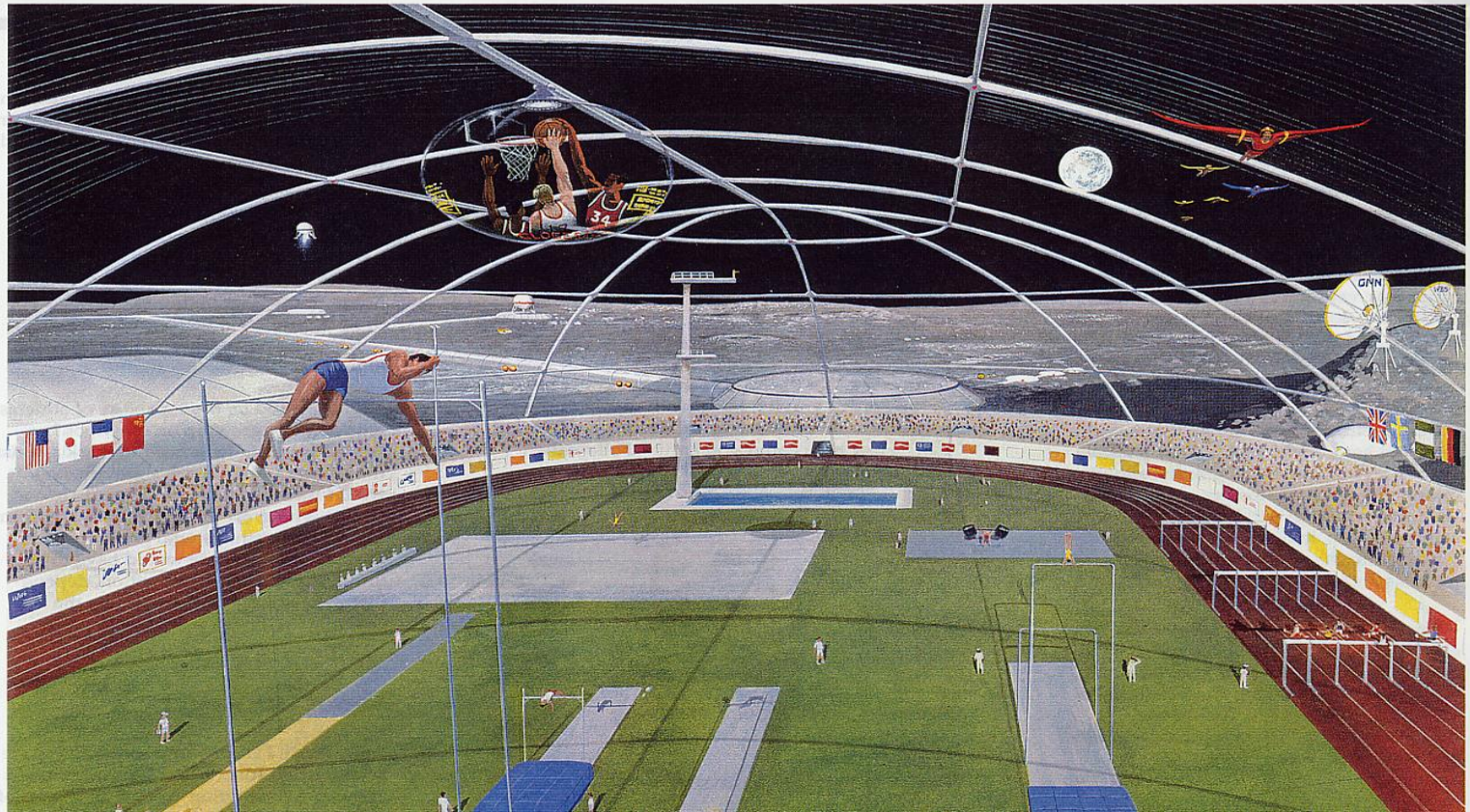
Robert Heinlein described
flying in a lunar stadium in
1957: sure to become
hugely popular ?





National Aeronautics and
Space Administration

The Lunar Games



NASA's 2006 illustration of a lunar stadium includes **flying sports**.



LUNAR UTILIZATION

ABSTRACTS OF PAPERS
PRESENTED AT A SPECIAL
SESSION OF THE SEVENTH ANNUAL
LUNAR SCIENCE CONFERENCE

16 MARCH 1976

SPECIAL SESSION ORGANIZED AND ABSTRACTS EDITED BY

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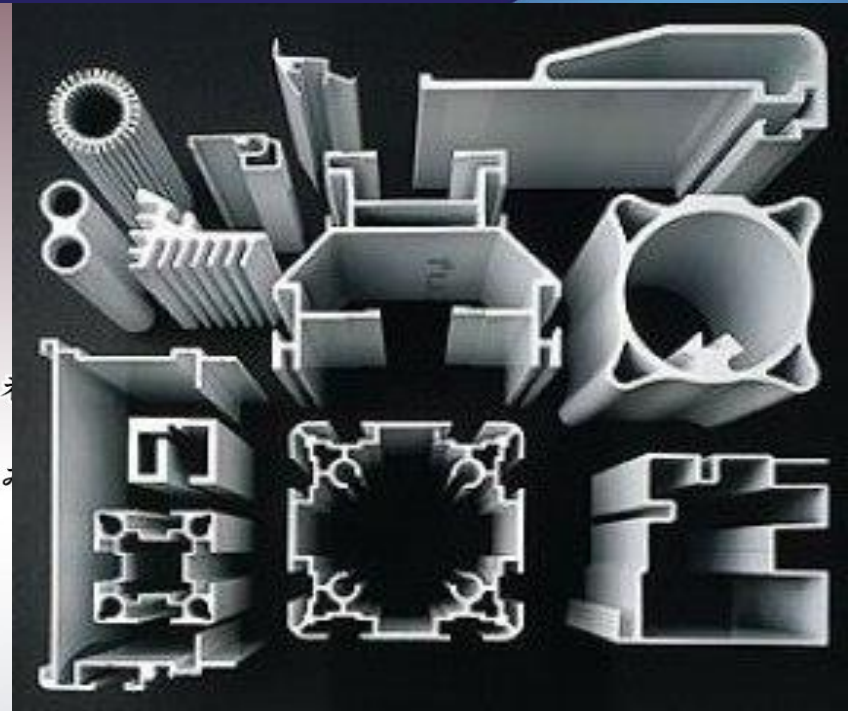
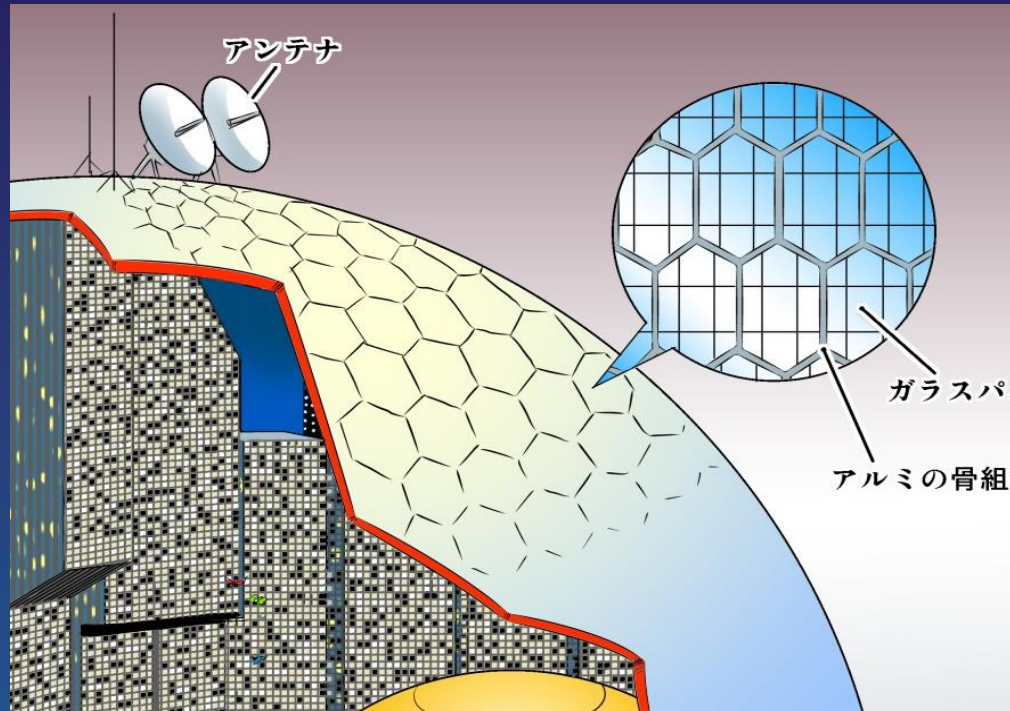
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There have already been
decades of research on
lunar surface engineering.



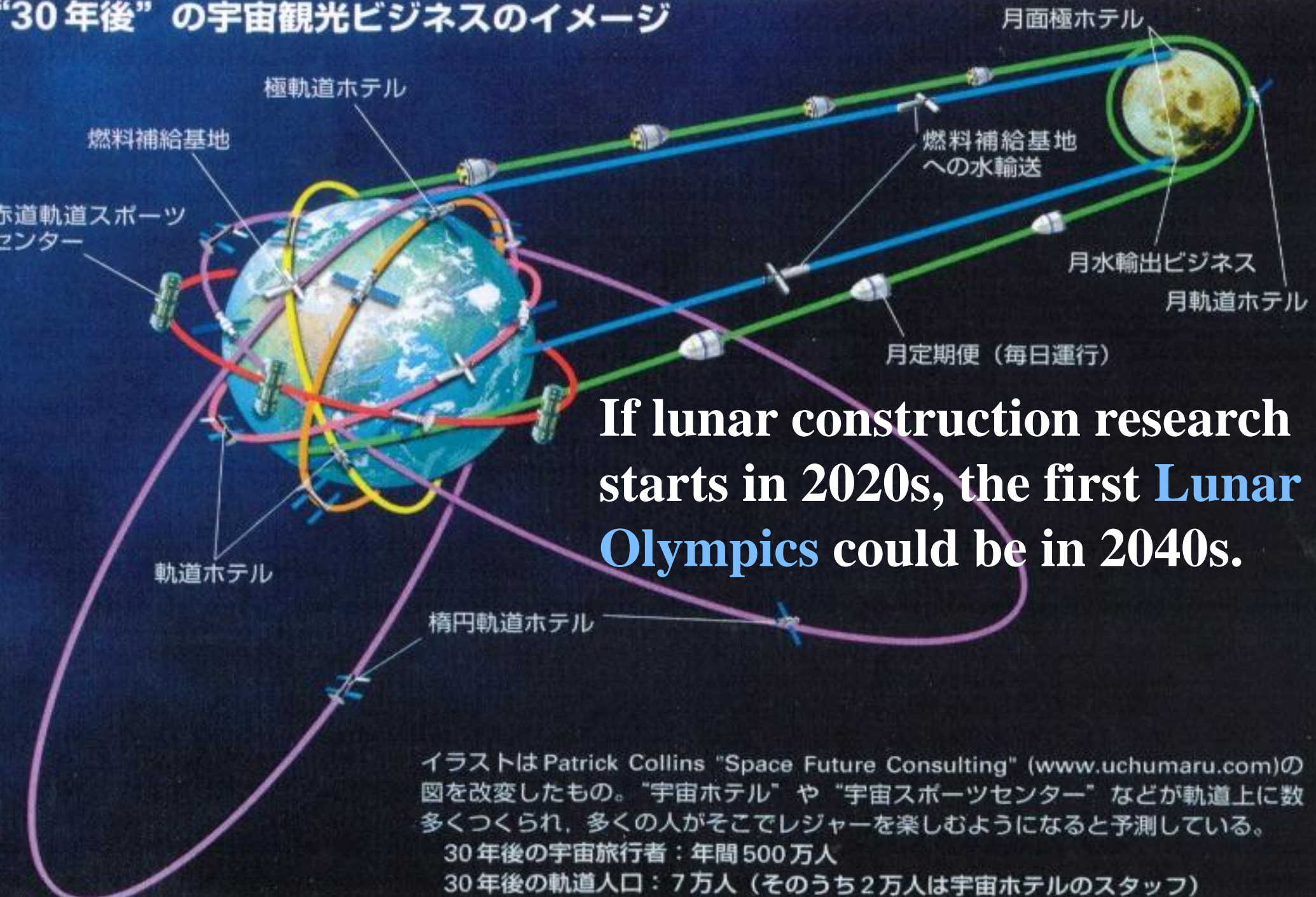
Lunar “**Dome city**”
with flying sports
stadium.



A hemispherical dome 600 metres in diameter will use about 20,000 tons of aluminium extrusions, and 100,000 tons of glass panels.

These are the annual output of a typical factory today.

“30年後”の宇宙観光ビジネスのイメージ



If lunar construction research starts in 2020s, the first **Lunar Olympics** could be in 2040s.

イラストは Patrick Collins "Space Future Consulting" (www.uchumaru.com)の図を改変したもの。“宇宙ホテル”や“宇宙スポーツセンター”などが軌道上に数多くつくられ、多くの人がそこでレジャーを楽しむようになると予測している。

30年後の宇宙旅行者：年間500万人

30年後の軌道人口：7万人（そのうち2万人は宇宙ホテルのスタッフ）



Space tourism can also create an optimistic vision of a future “**Open World**” for young people – contrary to the pessimism which they learn today.

This “**Space Renaissance**” has also been called the “**5th Industrial Revolution**”

Thanks for listening.