

Space commercialization and more

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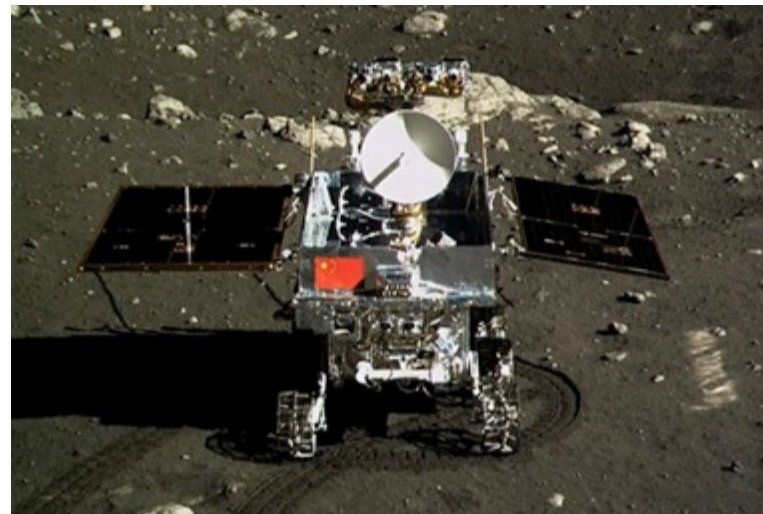
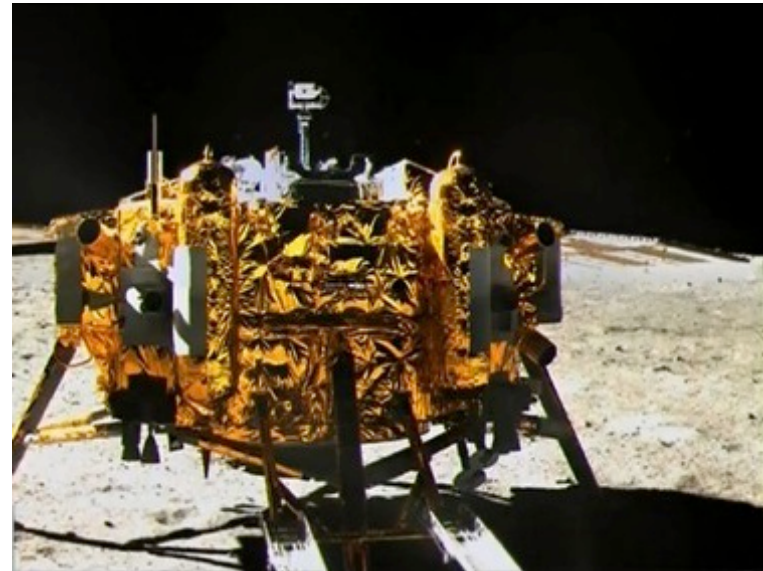
Ever wanted to be an astronaut?

Space now

- Manned missions are not “as popular as used to be”
- Lot’s of unmanned missions
 - Let’s check few recent of them

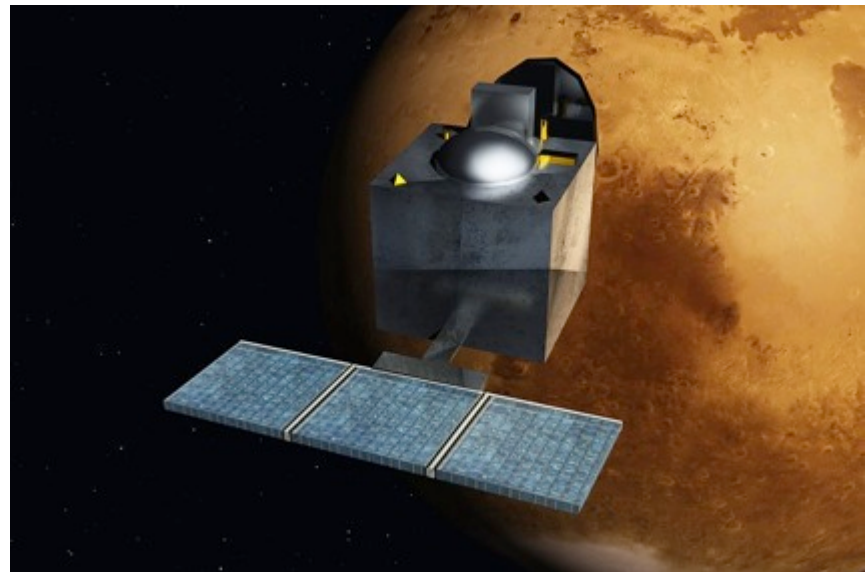
China National Space Administration

- Lunar exploration
 - Chang'e 3: lander
 - goddess of the Moon in Chinese mythology
 - Yutu: rover
 - Moon rabbit
- Landed on Moon 14 December 2013
 - Since 1976



Indian Space Research Organisation

- To Mars!!!
- Mars Orbiter Mission
 - Mangalyaan
 - (Sanskrit): Mars-Craft
- Planned to put into orbit 24 September of 2014



European Space Agency

- Moon is gone, Mars is gone, so let's **travel to Galaxy** 😊
- Build **3D map of Milky Way**
 - Gaia: Mother of the Earth and Universe
- Observe **~1 bn astro objects**
 - ~1% of the Milky Way population 😞
- ... measure the **diameter of a hair from 1000 km away** ...
 - Space is huge too



More nations joining space “club” ...

Companies too!



Elon Musk

PayPal[™]

SPACEX



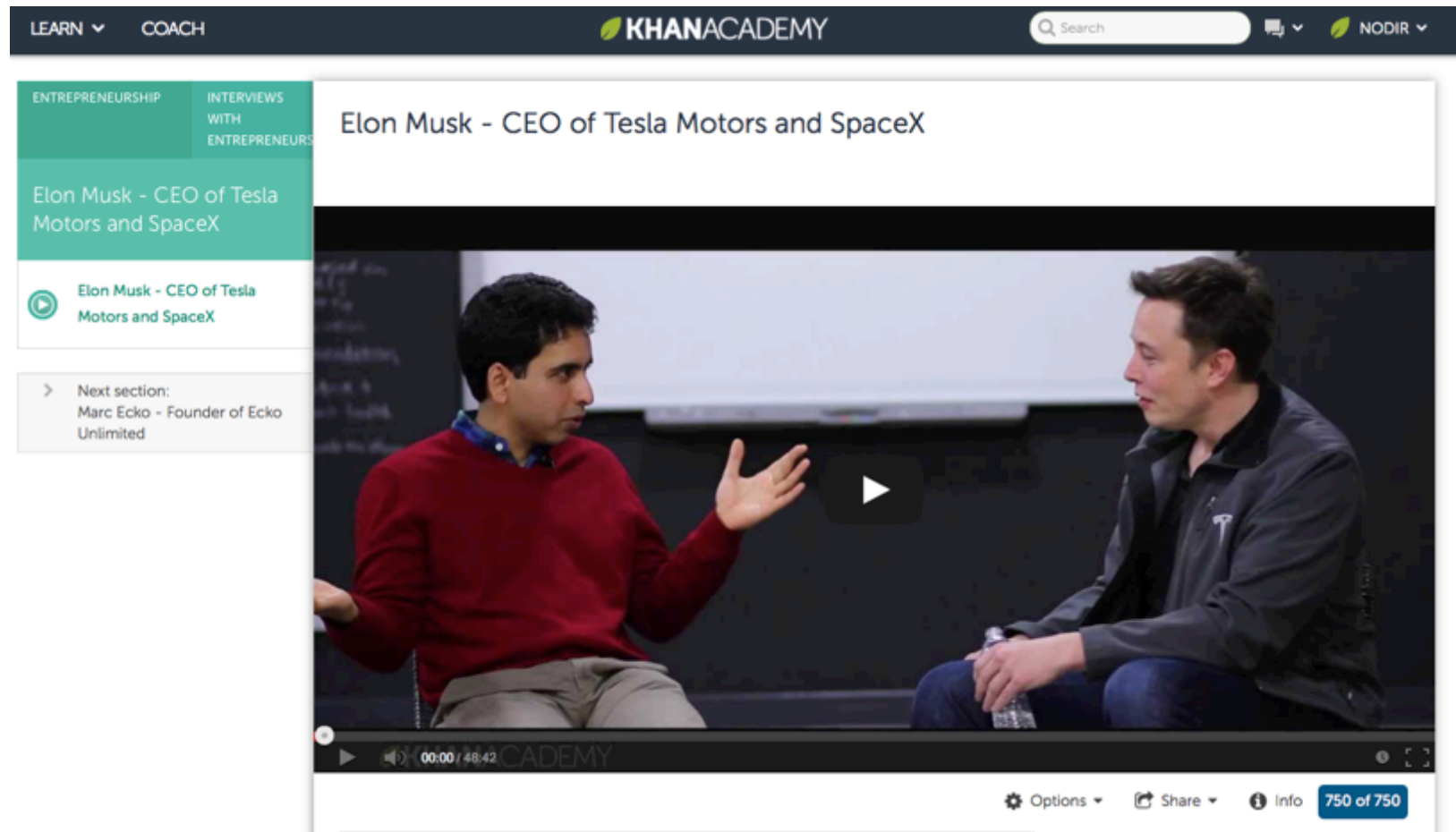
SpaceX – reusable rockets

<http://www.youtube.com/watch?v=ZxKWh7kLDzw>



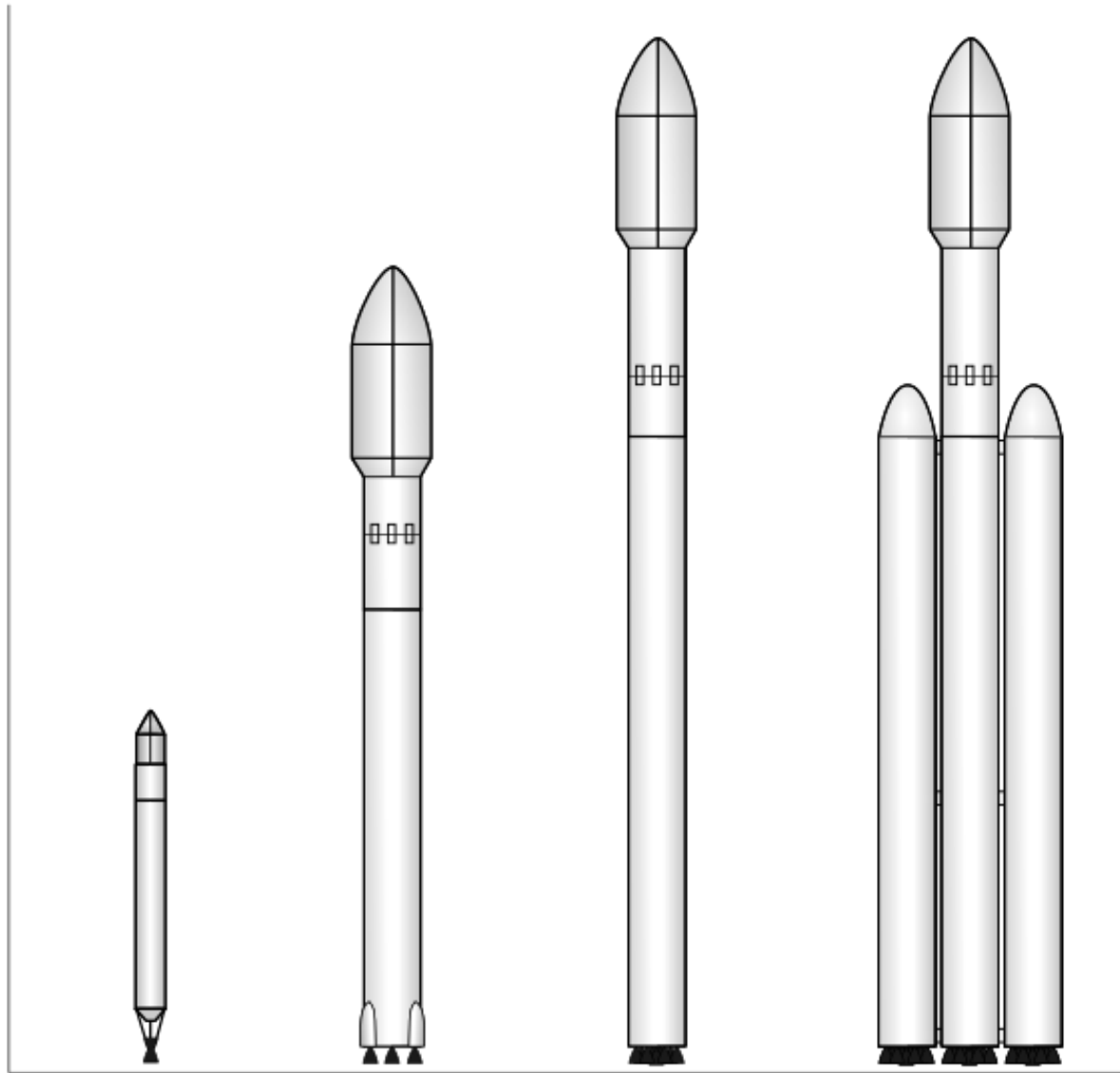
SpaceX - Grasshopper Vertical Takeoff Vertical Landing (VTVL) ...

Why reusable rockets?



The image is a screenshot of a Khan Academy video player. At the top, there is a dark navigation bar with 'LEARN' and 'COACH' on the left, the 'KHANACADEMY' logo in the center, and a search bar on the right. Below the navigation bar, the video player interface is visible. On the left side, there is a sidebar with a green header 'ENTREPRENEURSHIP' and 'INTERVIEWS WITH ENTREPRENEURS'. Below this, the video title 'Elon Musk - CEO of Tesla Motors and SpaceX' is displayed. A play button icon is visible next to the title. Below the title, there is a 'Next section: Marc Ecko - Founder of Ecko Unlimited' link. The main video player area shows two men sitting on a stage, engaged in a conversation. The man on the left is wearing a red sweater and is gesturing with his hands. The man on the right is wearing a dark jacket and is looking towards the first man. A large play button is centered over the video. At the bottom of the video player, there is a progress bar showing '00:00 / 48:42' and a '750 of 750' indicator.

Falcon line rockets cost 60 million dollars
Fuel is only 200 K => **0.00034 % of the cost!**



Falcon 1
Satellites to orbit

Falcon 9 v1.0 and v1.1
Cargo to ISS

Falcon Heavy
Crew to ISS and from
there to Moon, Mars

Golden Spike – Train to the Moon



Mount A Lunar Expedition With Us... *It's The 21st Century.*



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Expeditions to the Moon ...

For Sale to Countries, Corporations,
and Individuals.

Golden Spike seeks nations, companies, and individuals
seeking to explore the Moon.

[BUSINESS OBJECTIVES](#)

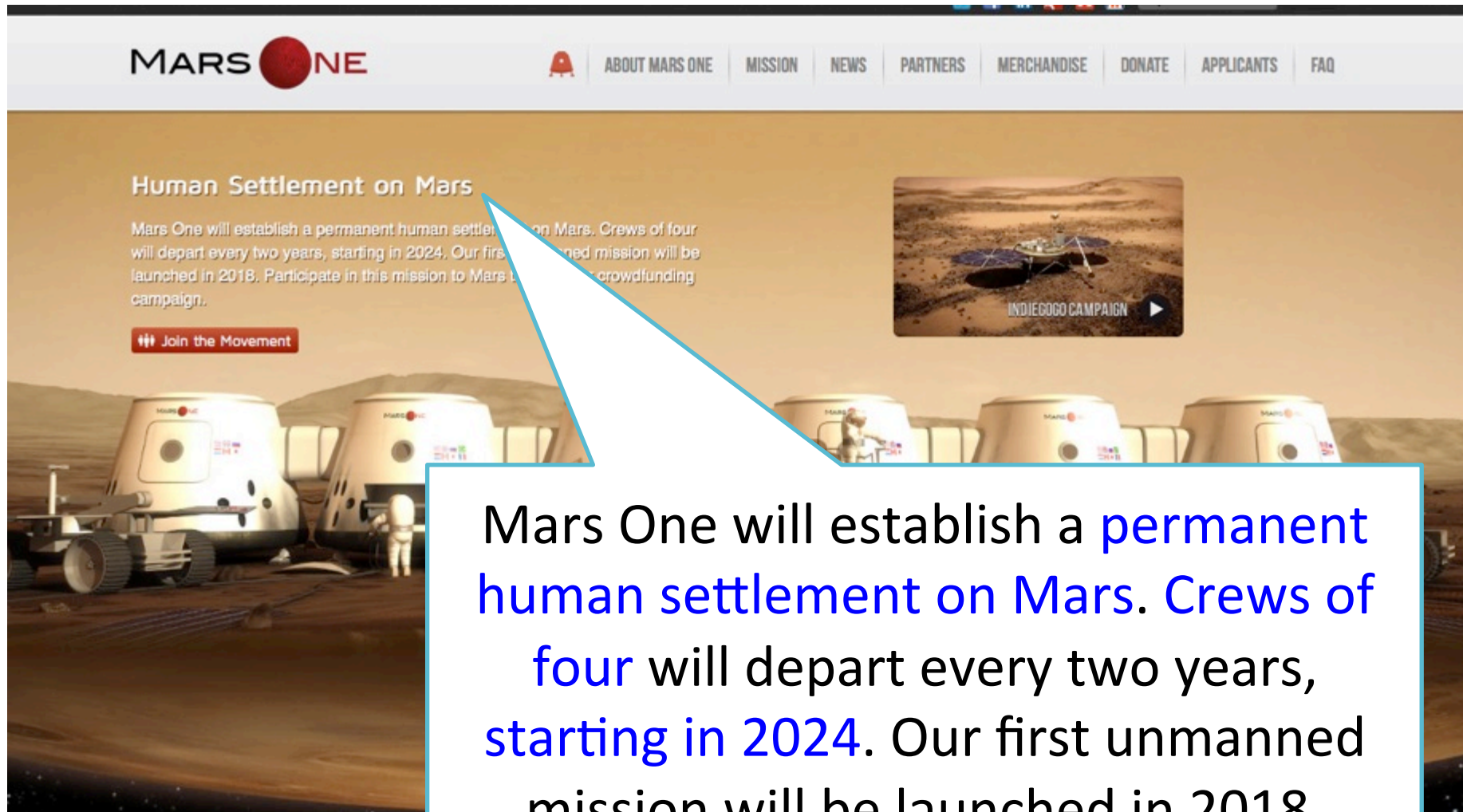
Serious? Who is backing them up?

- Mr. Gerry Griffin - Apollo Flight Director, former **Director of NASA** Johnson Space Center
- Dr. Alan Stern - planetary scientist, former **head of all NASA science missions**
- Mr. Jeff Ashby - former **NASA space Shuttle commander**
- ...

More about Golden Spike

- Dialog:
 - **Golden Spike**: we can give a ride to NASA, if they want.
 - **NASA**: Go for it!
- Company need to raise around **\$8 billion** to set up operations.
- Round trip cost to the Moon for one is **about \$1.5 billion**
 - round trip ~750,000 km
- Golden Spike's market research identified **25 nations that are in a position to afford** and have the desire for lunar expeditions...
- ... make money with **advertising, marketing and media deals**, including naming rights for its spaceships ...

MarsOne



MARS ONE

ABOUT MARS ONE MISSION NEWS PARTNERS MERCHANDISE DONATE APPLICANTS FAQ

Human Settlement on Mars

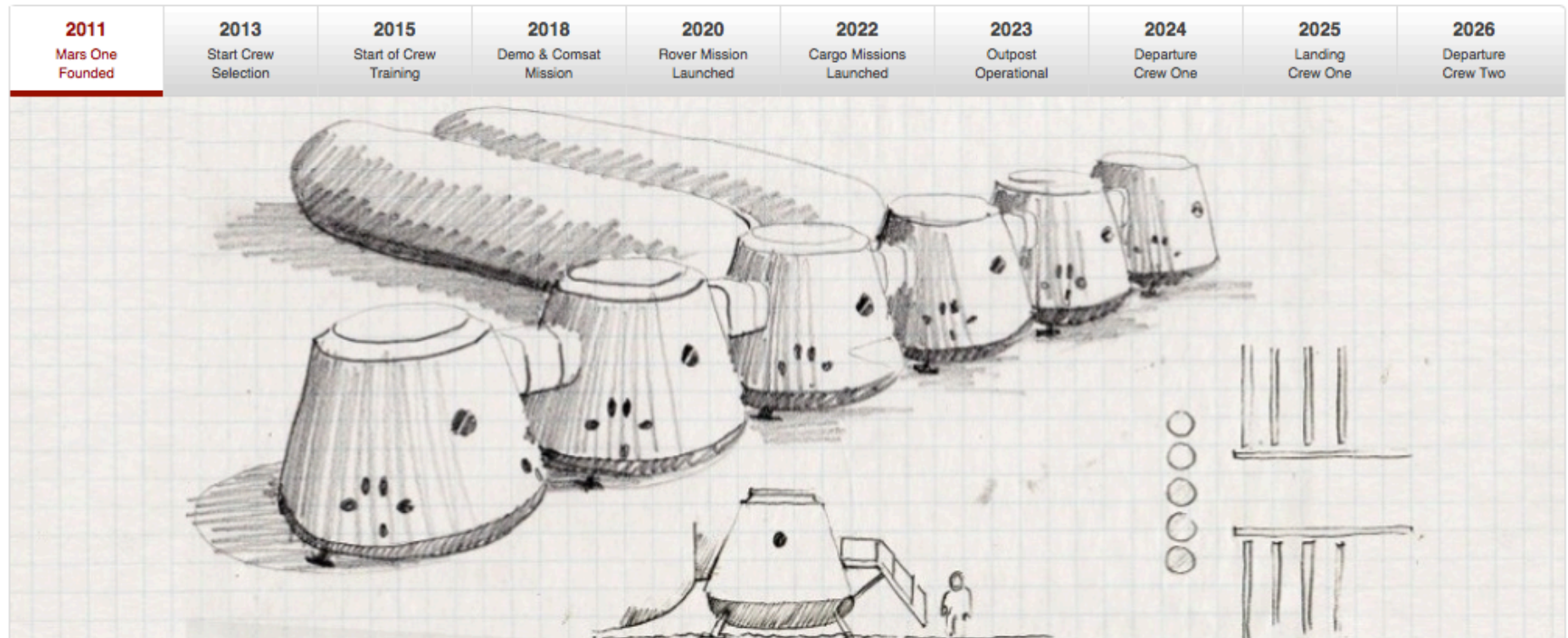
Mars One will establish a permanent human settlement on Mars. Crews of four will depart every two years, starting in 2024. Our first unmanned mission will be launched in 2018. Participate in this mission to Mars by joining our crowdfunding campaign.

Join the Movement

INDIEGOGO CAMPAIGN

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Roadmap



Foundations of mission plan laid

In 2011 Bas Lansdorp and Arno Wielders lay the foundation of the Mars One mission plan. Discussion meetings are held with potential suppliers of aerospace components in USA, Canada, Italy and United Kingdom. Mission architecture, budgets and timelines are solidified from feedback of supplier engineers and business developers. A baseline design for a mission of permanent human settlement on Mars achievable with existing technology is the result.

Unfortunately it's one way ☹️

- Project costs **\$6-billion**
- Company's public announcement
 - Who wants to fly to Mars, **it's a free ride!**
- ~200.000 already applied, **from 140 countries**
- 7000 Canadians too
- Application **fee \$5~75** depending on country
 - Average \$50 x 200 K = **10 million already** 😊
 - **Reality show** is planned to select the candidate
 - ... and other ways of making money ...

Martian time

Earth “day” = Mars
“sol” (from *solar day*)

1 sol = 24 hours 39
minutes 35 seconds

Sol = Day + 40 mins

[David Oh](#) - Lead Flight
Director for the Mars
Science Laboratory
rover Curiosity, NASA





Followed Mars sol
over a month
starting from the
first day of
Curiosity's landing



List of NASA planet observations

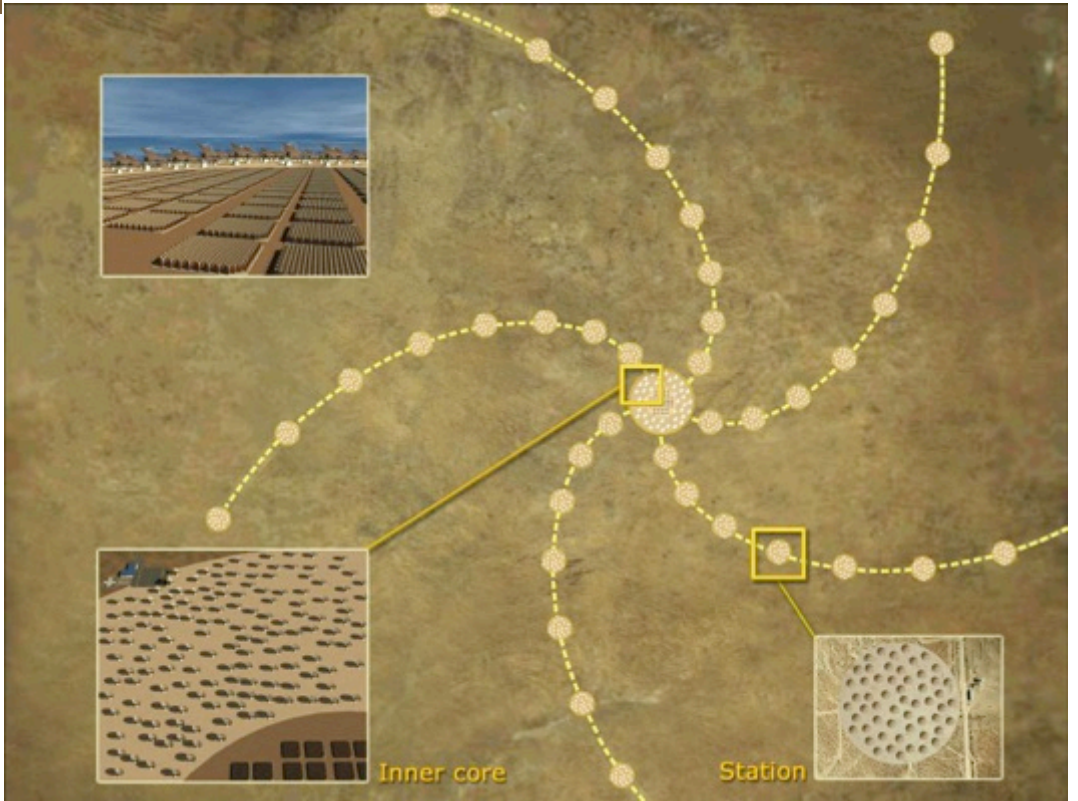
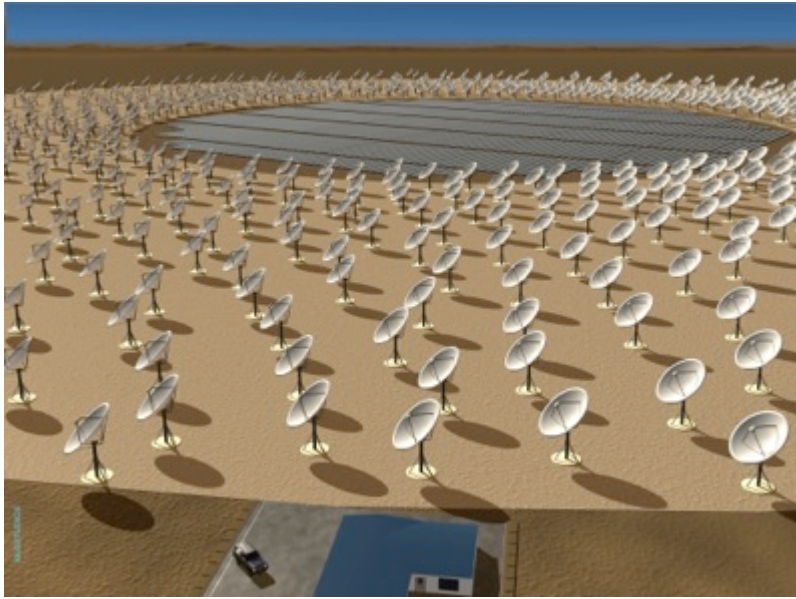
	Earth	Moon	Mars	Mercury	Venus	Sun	Universe and others
Past (from 1958)	14	16	15	1	3	1	10
Current	14	1	4	0	0	0	15
Future	6	0	2	0	0	0	3

Source: <http://www.jpl.nasa.gov/missions/>

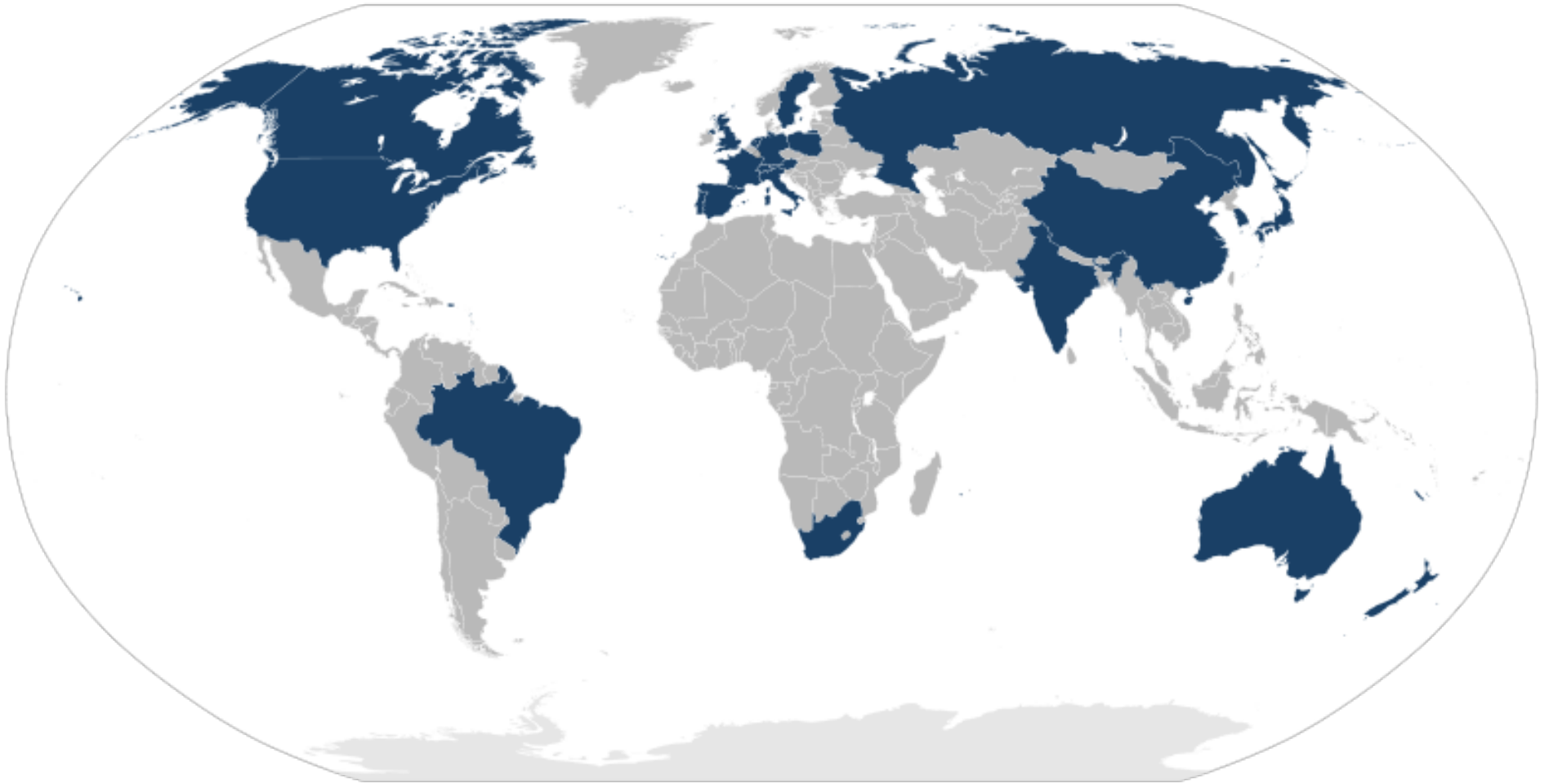
My favorite



- SKA is a radio telescope in development in [Australia](#) and [South Africa](#) which will have a total collecting area of approximately [one square km](#)



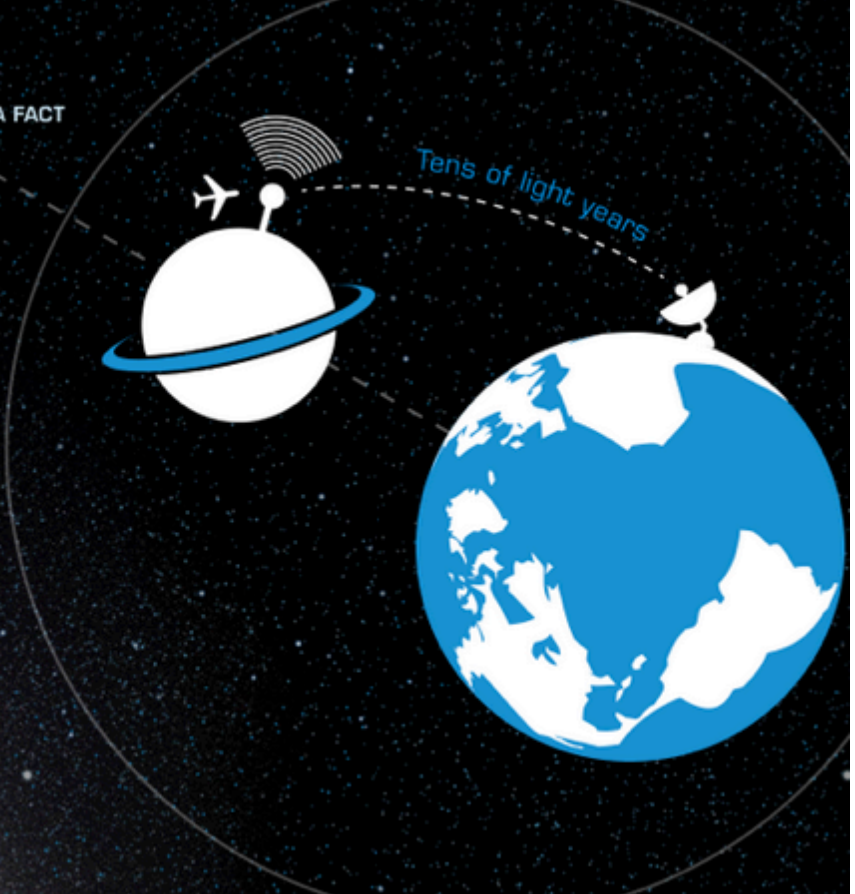
Participant countries



Sensitivity

AMAZING **2** SKA FACT

The SKA will be so sensitive that it will be able to detect an airport radar on a planet *tens of light years* away.



The diagram illustrates the sensitivity of the SKA. It features a large blue circle representing Earth on the right, with a white satellite dish on its surface. To the left is a white planet with a blue ring, representing a distant planet. A dashed line connects the satellite on Earth to the planet, with the text "Tens of light years" written along the line. Above the planet is a white airplane and a radar antenna emitting concentric arcs. The background is a dark space with a starry field and a nebula.

Optical cables

AMAZING **5** SKA FACT

The SKA will use enough optical fibre to wrap *twice around the Earth!*



The infographic features a blue and white Earth globe with two white orbital rings. To the right of the globe, a bundle of white lines representing optical fibers extends outwards. A small white box with a black border containing the text '2x' is positioned above the fiber bundle. A dashed white line connects the number '5' in a blue circle to the fiber bundle. The background is a dark space with a faint Milky Way galaxy.

AMAZING

4

SKA FACT

The dishes of the SKA will produce *10 times* the global internet traffic.



10x

AMAZING

6

SKA FACT

The aperture arrays in the SKA could produce more than *100 times the global internet traffic*.



100x

Why important?

- Key projects

- Galaxy evolution, dark matter and dark energy
- The origin and evolution of cosmic magnetism
- Extreme tests of general relativity
- Extraterrestrial life and habitable planets



Don't explore, fix Earth!!!



Stephen Hawking at TED 2009

- I'm convinced that one day we human will have to **colonize the other planets** in order to survive.
- Space travel will become an **everyday necessity**.
- ...
- To confine our attention to terrestrial matters would be **to limit the human spirit**.

Aim high, keep exploring 😊

Thanks for listening &
enjoy your weekend!