Future Mars Mission Demonstration with Gamification: Next Gen. Workforce Development and Self-KM for Space Education

European Space Agency
Agence spatiale européenne

SAMARA UNIVERSITY

UNITED NATIONS
Office for Outer Space Affairs

OZAN KARA
okara13@ku.edu.tr
ozan.kara@spacegeneration.org

KOÇ ÜNİVERSİTESİ

- Teaching Assistant
- Small Satellite, Electric Propulsion
- Mars Mission Design
- MEMS
- Space Medicine

ASTRONAUTICA AD PACEM HOMINUMQUE PROGRESSUM

- IPMC Young Professional Workshop Delegate since 2012
- Space Propulsion
- Knowledge Management and for Space Organizations
- Space Education and Outreach

SPACE GENERATION ADVISORY COUNCIL

- National Point of Contact of Turkey

AIAA
American Institute of Aeronautics and Astronautics

- Young Professional
- Small Satellites
- Systems Engineering

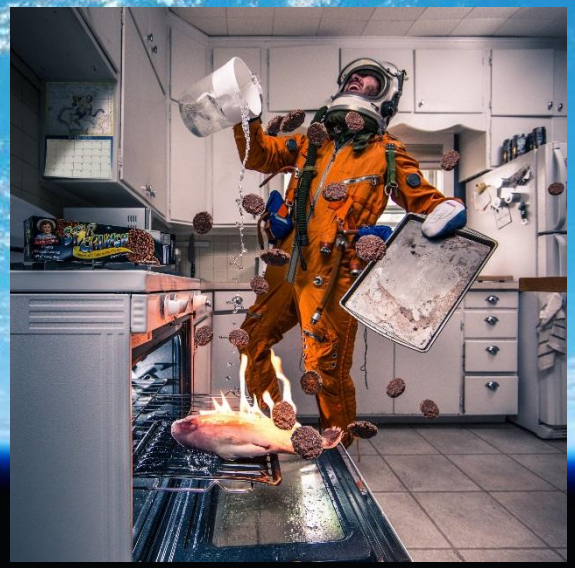
1. *If you stranded on Mars, what would be 3 things you bring with you?*

2. *If you were the first person step on Mars, what would you say?*

Credit: NASA

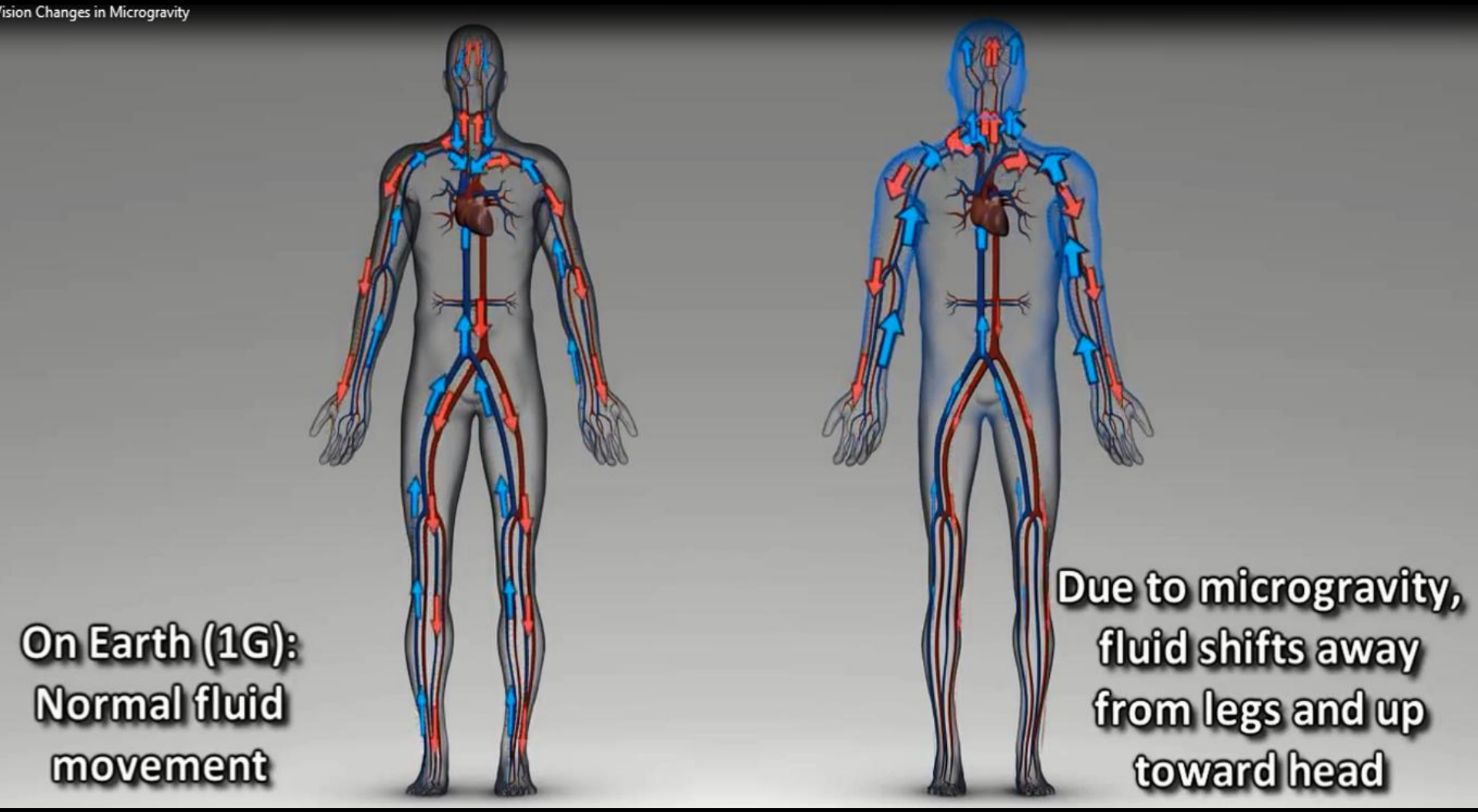
Groundwork	ISS and Astronauts
	Earth Independent/Dependent Zone
	Self-KM Definition
	Gamification Lay-out
Capacity Building	Next Generation Workforce Development
	Gamification Applications

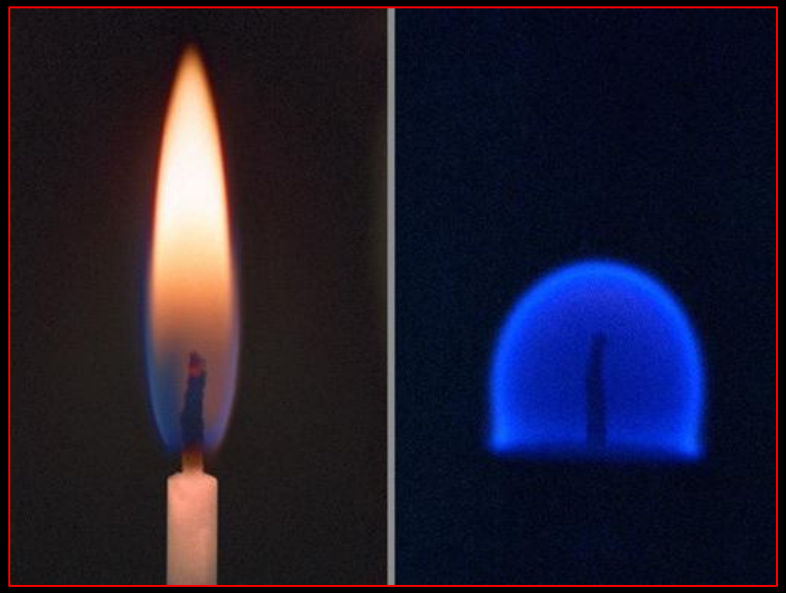

October 28, 2013
November 13, 2013
miles

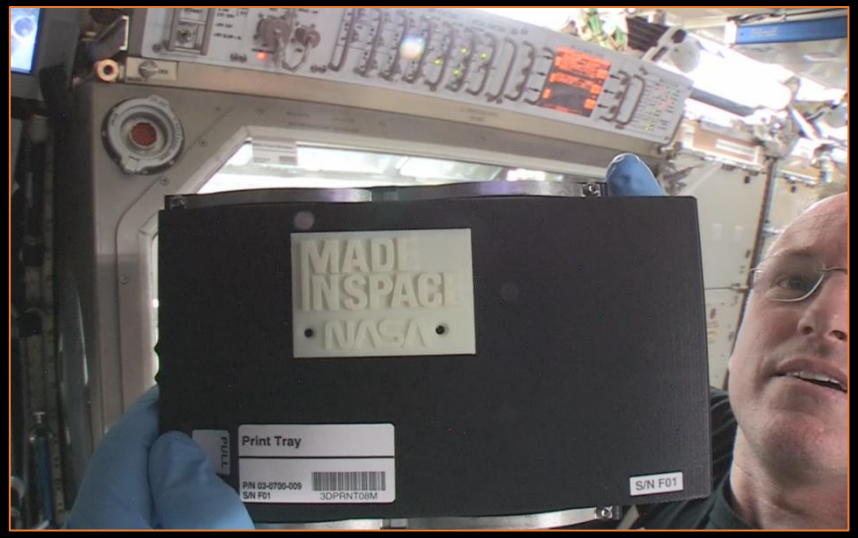


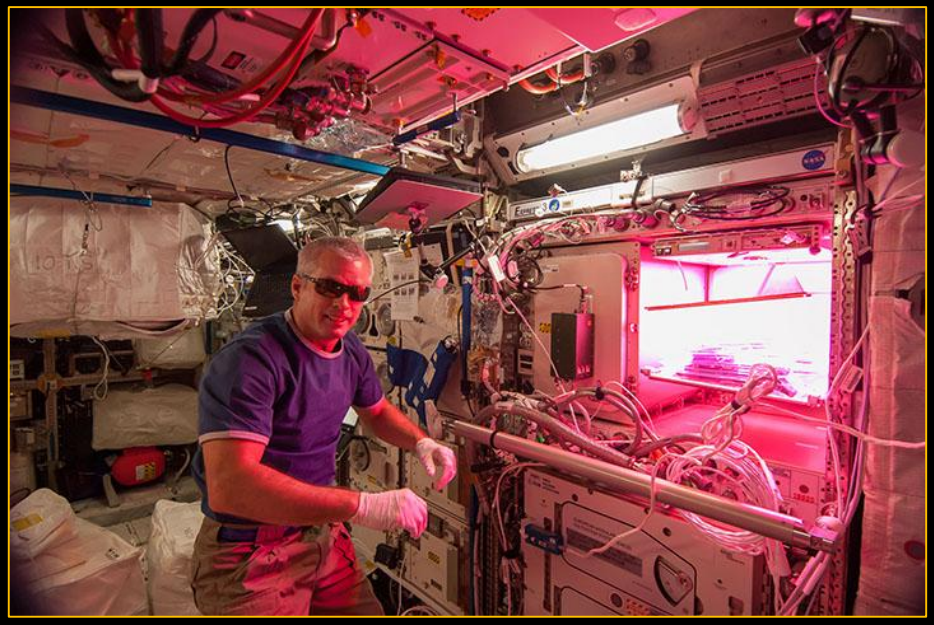

To LAB
To HAB

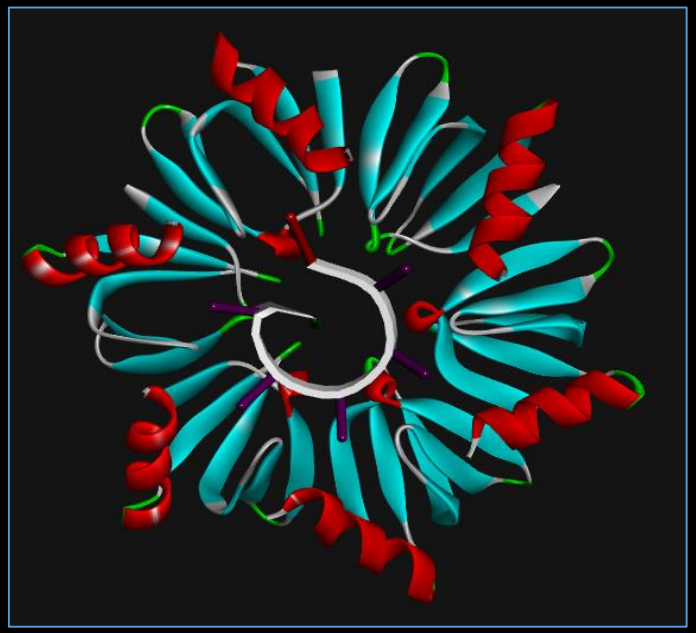
Liquid Flow Comparison



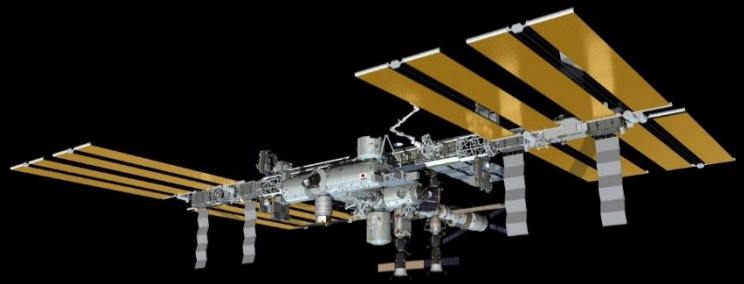



MADE IN SPACE
NASA
Print Tray
P/N 03-0700-009
S/N F01
3DPRNT08M
S/N F01

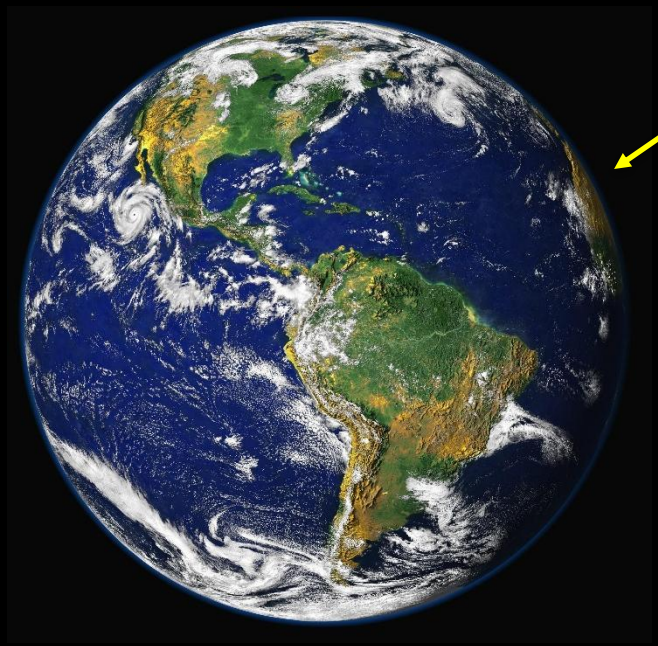




Today:
Earth Dependent Zone



350-420 km



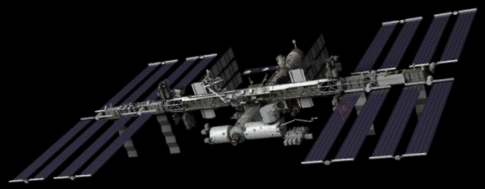
- Almost Real Time Comm.
- Astronaut Transfer
- Cargo and Logistic
- Emergency and Feedback

Astronaut Health Triangle

?

?

10^{-6}g

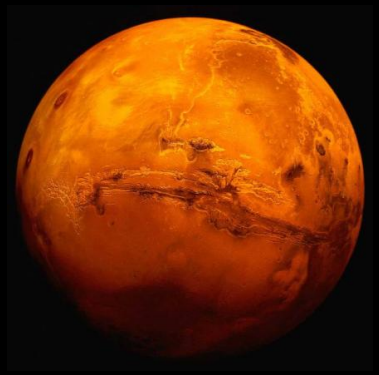


1.62 m/s^2

3.711 m/s^2

1 g
9.807 m/s^2

Future: Earth Independent Zone: Mars



Apr. 08, 2014 – 92.4 millions km
May. 22, 2016 – 75.3 millions km
July 27, 2018 – 57.6 millions km
Sept. 13, 2020 – 62.1 millions km

100 times thinner atmosphere
No magnetic fields
Water evaporates quickly

Communication Delay
Whatsapp (Text) 6 min.
Skype (Voice/Video) up to 22 min.
«Curiosity Rover 13 min»

Phoenix Rover 2008, NASA

After 4 SOL

Terminal Vevocity Comparison

Crashed with Mach 1.5!

Landing with Mach 0.15

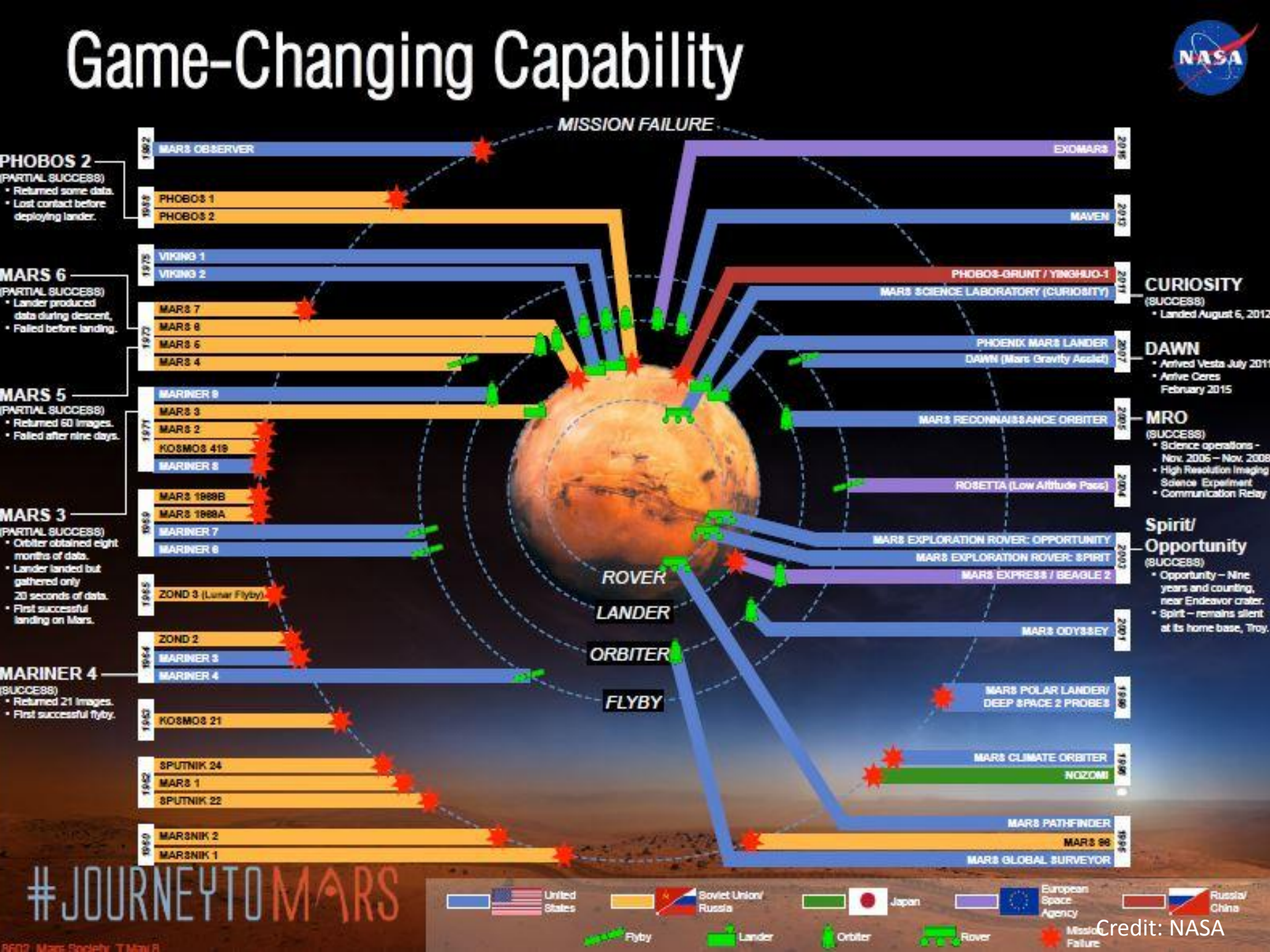
Genetic Variation

Sustainability

Cost ?

Adaptation

Game-Changing Capability



Credit: NASA

SELF – KNOWLEDGE MANAGEMENT

«examination of the accuracy of the self-views»

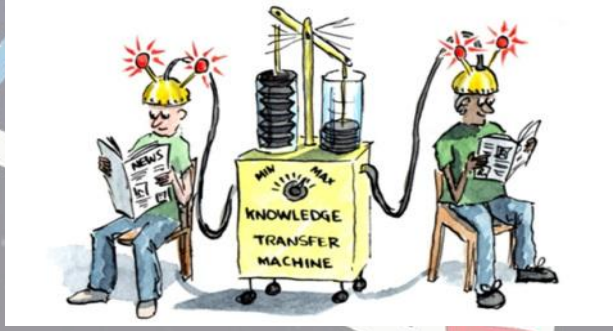
Unites
Social and personality psychologies:

unconscious
introspection
accuracy
bias

cognition of motives, behaviors, attitudes, emotions, relationships and empathy

Reveal personal mistakes from ***everyday life experiments***

INTANGIBLE IMPACTS IN CAREER



Predispositions

Awareness of Blindspots

Learning Phase

Mental States

Early Career: Personal Memories

Self-Concept

Self-Enhancement

Motivation
Job Environment

Cognitive psychology
Driver of Decision Making

Younger Ages & Social Influence
Case: Accept from undergrads rather than PhDs

Increase Mission Success

Prevent Possible Mission Failures

Education and training

Identification of certain needs

Mars Mission Concept

Gamification

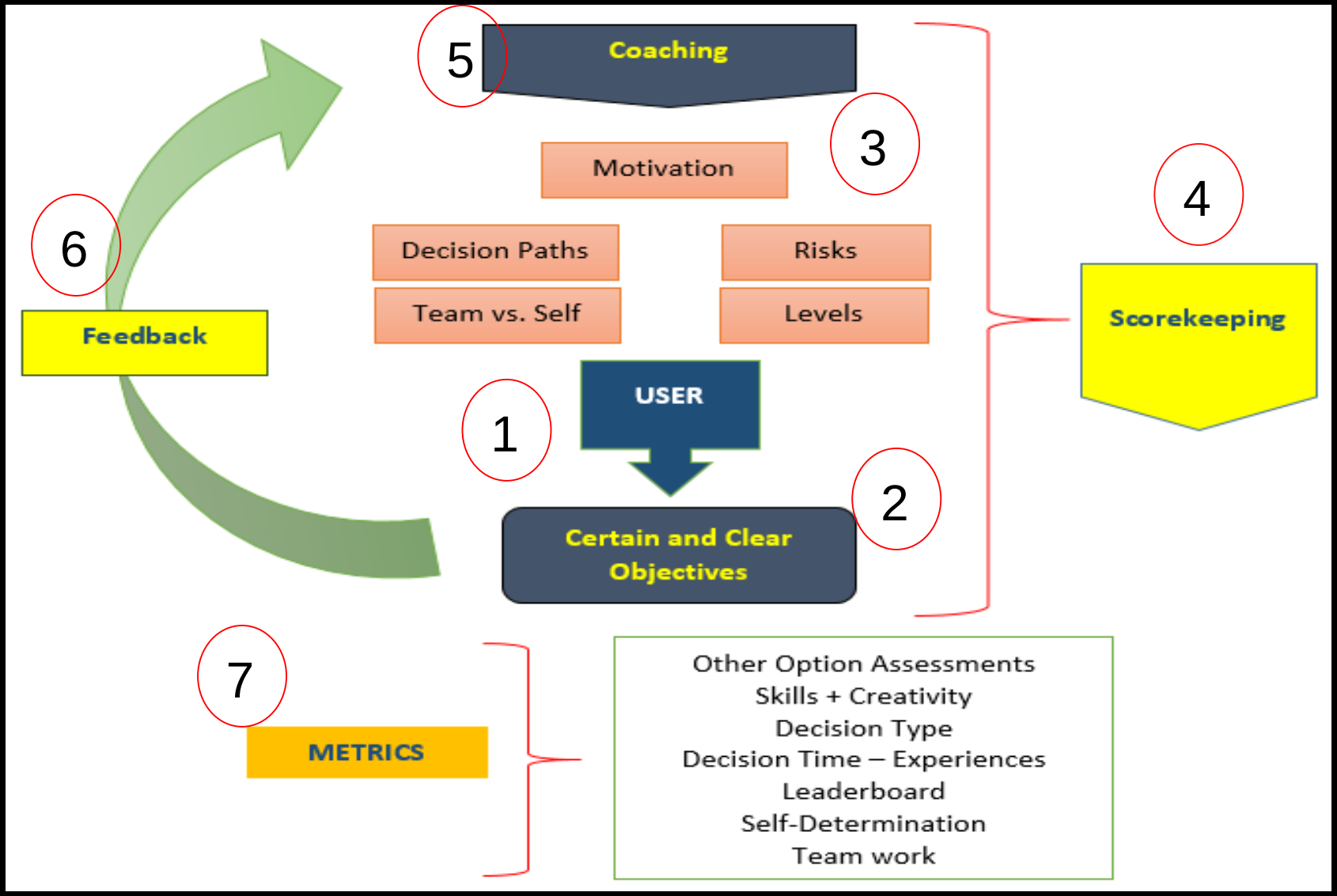
Education

Workforce Development

Socioeconomic & Sociological

Self Knowledge Management

Gamification Lay-out



Mars Mission Concept – Gamification Scenarios

Mars Ascent Vehicle Test

- Additive Manufacturing Instruments, Communication Instruments
- Instrument Testing During the Ascent, Atmosphere Measurement

Nano Satellite Orbiter - Low Cost Mission Design

- Weather Analysis
- Communication with the Earth
- Micro Fluid Analysis: From orbit to the surface

Mars Mission Concept – Gamification Scenarios

Surface Operations

- Plant growth on the Mars Surface
- Bacterial Growth and Virulence Analysis:Salmonella typhimurium, Pseudomonas Aeruginosa and E.coli could be starting points

Micro Air Vehicle & Flying Robot

- Sustainable Operations - Imaging
- Nano Orbiter Data Transmit & Receive

Educational Outcomes

- Digital 3D Printing
- Mars Atmosphere Analysis

Next Generation Worksforce Development

IPMC YP WS 2015 Group 6 Approach

Intellectual Freedom	Commercial - Budget	High Level Tech.
Teaching Experience	Documentation	Responsibility
Mentoring Skills	SE, PM Skills	Hands-on
Computation & Design	Bridge Over	Joint Programs

$$\boldsymbol{f}\,(academia, industry, government) = Individual\ Aspects$$

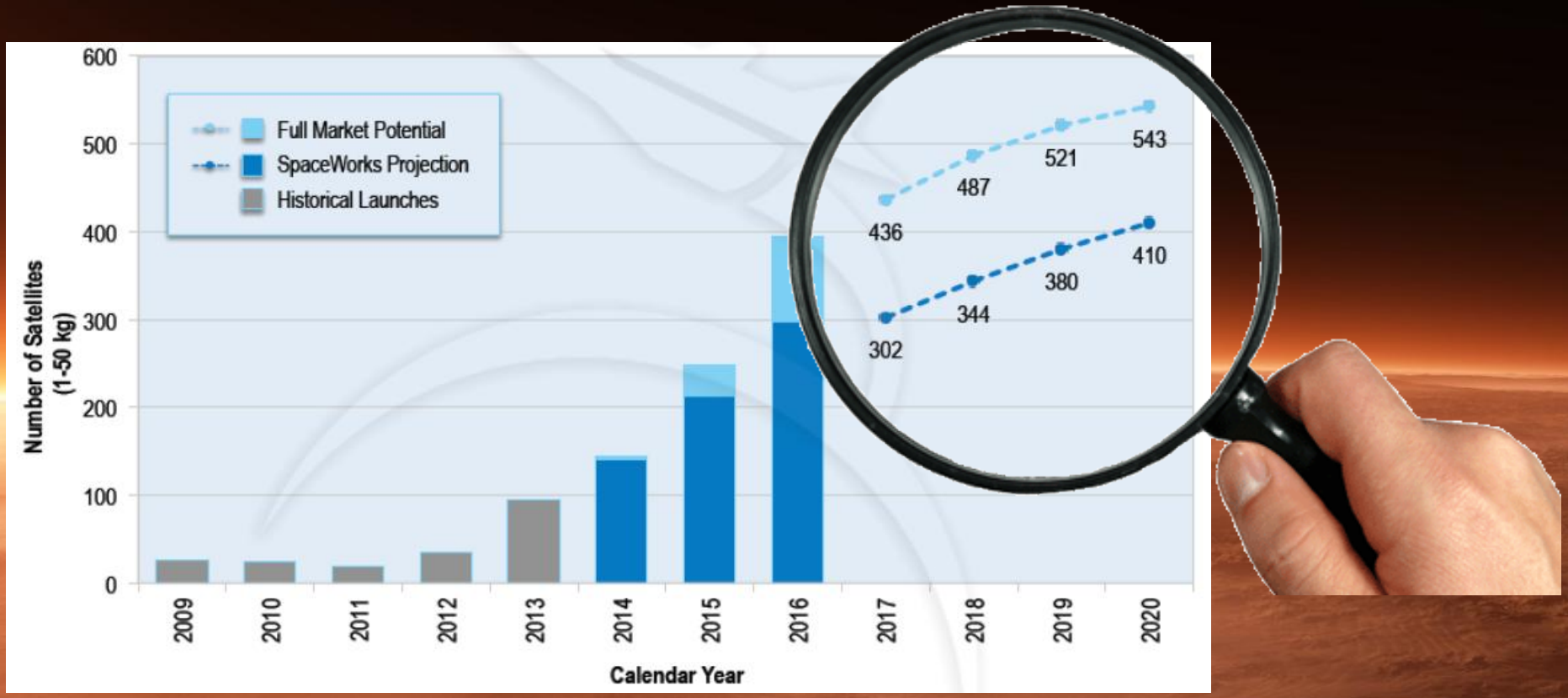
$$\boldsymbol{g}(academia, industry, government) = Common\ Aspects$$

$\boldsymbol{f}$

K12 Education
Student Internships
Organization Structures

$\boldsymbol{g}$

Political/Sociological Lacks
Workforce Demand
Boss vs. YP Relations



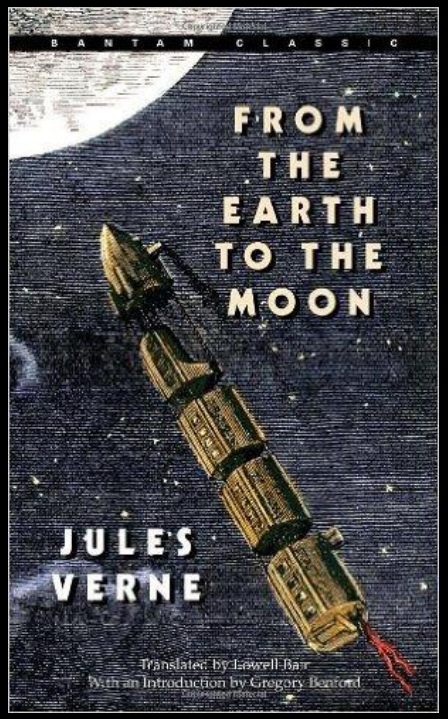
FUTURE SMALL SATELLITE WORKFORCE – AT A GLANCE

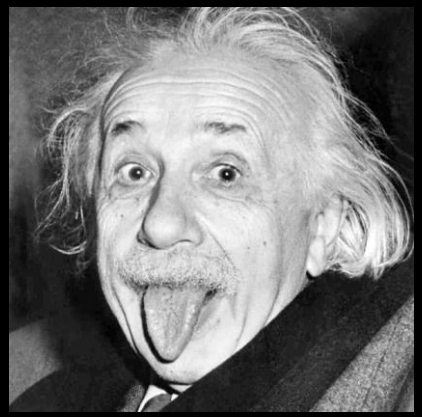
2013 OECD – 900,000 people excl. Universities & research institutions

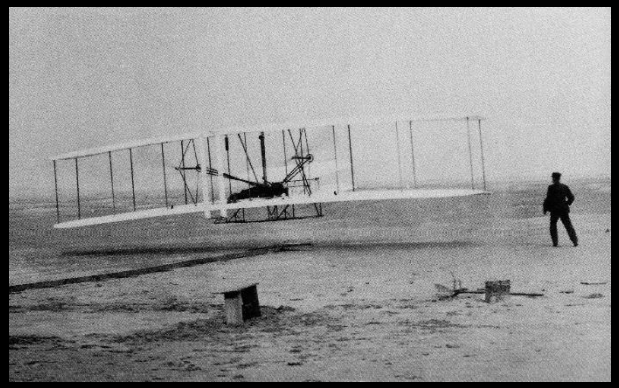
2500 Nanosatellite Launches between 2014 – 2020

Estimation for nanosatellite workforce: **Up to 50,000 young people**

#DreamToReality







Ozan Kara, Dolapdere Istanbul 2012

THANK YOU FOR YOUR SUPPORTS!

To infinity and beyond…

esa
European Space Agency
Agence spatiale européenne

SAMARA UNIVERSITY

UNITED NATIONS
Office for Outer Space Affairs