Agenda

- **Part I – Great Decision Lecture**
- **Part II – Is Space Exploration worth it?**
- **And if we have time left:**

  Part III – Are we Humans just brief ripples of Cosmic Energy?

The United Nations' Space Laws signed by USA, China, Russia and 111 other Countries

The Committee has concluded five international treaties dealing with issues such as:

•non-appropriation of outer space by any one country,

•arms control,

•the freedom of exploration,

•liability for damage caused by space objects,

•the safety and rescue of spacecraft and astronauts,

•the prevention of harmful interference with space activities and the environment,

•the notification and registration of space activities,

•scientific investigation and the exploitation of natural resources in outer space and

•the settlement of disputes.

Each of the treaties stresses the notion that outer space, the activities carried out in outer space and whatever benefits might be accrued from outer space should be devoted to enhancing the well-being of all countries and humankind, with an emphasis on promoting international cooperation.

Part I - Great Decisions Outer Space Policy Lecture:

- Space Exploration until early 2000
- China
- Space X
- Military Space
- Commercial Space
- Policy Implications
- Great Decisions Questions.

Discussion Questions

- Should our collaboration in space with Russia be changed after the invasion of Ukraine?
- How should the US be addressing China's increased presence in space?
- Is the space policy reflective of our Pacific policy and our relations with China?
- What advantage does China have to stimulate their own commercial space industry that the US does not have?
- Should the US maintain Trump's "US Space Force" program in the event that a shooting war breaks out?
- Does the international space station indicate the possibility of positive diplomatic relations in space, or will it be more competitive?
- What current problems might be solved from yet undeveloped space technologies?
- Is there a (outer space) line that shouldn't be crossed?

Part II – is Space Exploration worth it?

- **Does Human exploration make sense?**
- A trip to the Moon takes < 3 days, traveling to Mars takes 7 months.
- To survive and thrive on the moon and/or on Mars we need
- Water
- Energy
- Shelter
- Food
- The same things to survive here on Earth.

- **What are your thoughts on humans exploring outer space?**

SpaceX 5 years of Falcon Rocket landings

Launch of Skylink satellites (60 of 30,000)

SpaceX, NASA getting ready for astronaut launch using “Dragon” Capsule

SpaceX's "Starship" flies high altitude test (and later to Mars)

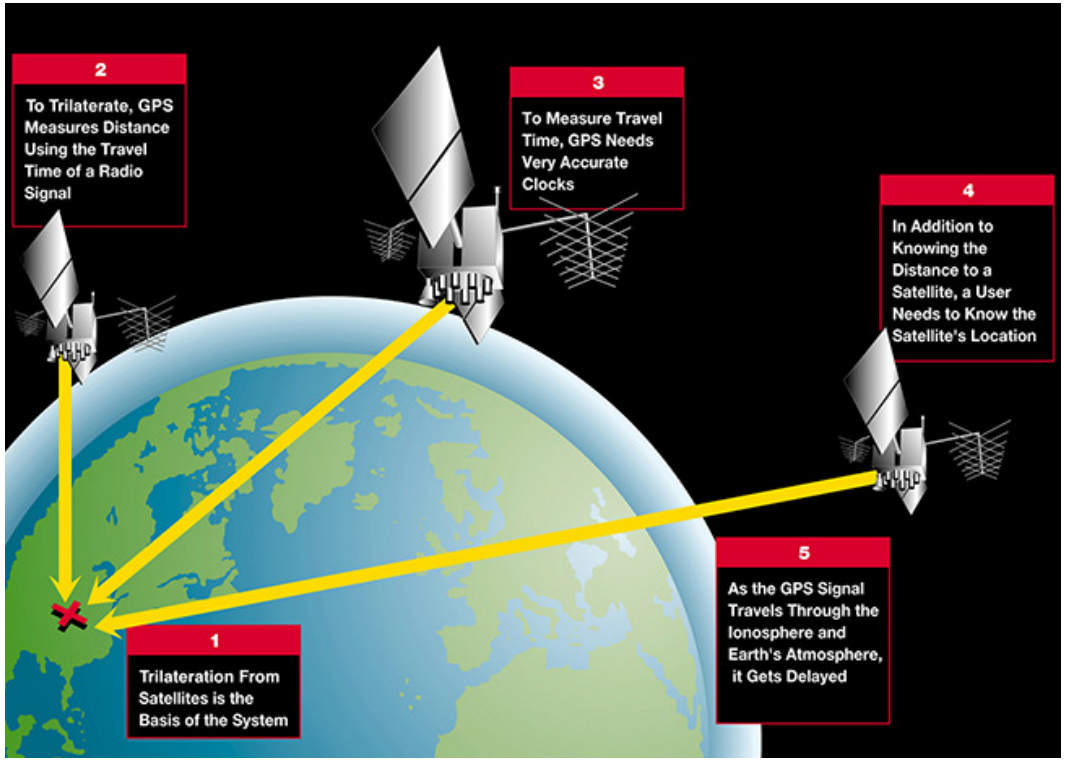
Have you personally benefited from “outer space” technologies?

- Weather Satellites save lives (millions)
- Satellite TV
- Global Positioning System (GPS) Navigation.
- Google Earth
- Satellite Phones
- Solar Panels
- Water purification
- **Would you rather live without these benefits?**

Satellite Navigation – GPS – How it works.

- Satellite Navigation is based on a global network of satellites that transmit radio signals from medium earth orbit (1200 – 22000 miles above earth).
- 31 **Global Positioning System** (GPS) satellites developed and operated by the United States.
- Three other constellations also provide similar services.
- **GLONASS** developed and operated by the Russian Federation,
- **Galileo** developed and operated by the European Union, and
- **BeiDou**, developed and operated by China.
- All providers have offered free use of their respective systems to the international community..

Global Positioning System – How it works



International Space Exploration Coordination Group's (ISECG) 2013 Paper "Benefits Stemming from Space Exploration:

- **Commercial Benefits:**
- **Past Innovation:** see previous slide
- **Future benefits:** materials, power generation and energy storage, recycling and waste management, advanced robotics, health and medicine, transportation, engineering, computing and software.
- Leading to better **services** on Earth, better return on investment in institutional and commercial activities.
- But countries need economic & political power to support these programs.
- **Do you think these Benefits outweigh the costs of exploring Space?**

ISECG's 2013 Paper continued

- **Cultural Benefits:**
- Space exploration missions fulfill people's curiosity.
- Producing fresh data about the solar system.
- **Brings us closer to questions such as**
- "What is the nature of the Universe?"
- "Is the destiny of humankind bound to Earth?"
- "Are we and our planet unique?"
- "Is there life elsewhere in the Universe?"
- **Should we have a policy to answer those questions?**

ISECG's 2013 Paper conclusions:

- **New Means to Address Global Challenges:**
- Will help advance international preparedness from protecting the Earth from catastrophic events such as some asteroid strikes.
- Will advance collaborative research on space weather.
- Will protect spacecrafts by developing new means for space debris removal.
- Will help to implement policies for environmentally sustainable development.
- **What do you think? Realistic?**

Part III- Are we Humans just briefly ripples of Cosmic Energy?

Let's ask Carl Segan about the Universe

- Many cultures answer is "God created the Universe out of nothing".
- Next question: where did God come from?
- If we cannot agree on that then
- The origin of the Universe is an unanswerable question.
- Or we say, "God always existed", then we can say
- The Universe always existed, no need for a creation.
- Who knows for certain?
- This question was asked already 3500 years ago in India.

Humans are made of Elements listed in the Periodic Table:

- **96.2% of your Body Weight is made of:**
- O - Oxygen 65%,
- C - Carbon 18.5%,
- H - Hydrogen 9.5%,
- N - Nitrogen 3.2%
- **Add** Calcium (Ca), Phosphorus (P) , Potassium (K) = **99.1%**
- **Add** Sodium (Na), Chlorine (CL), Magnesium(Mg), Sulfur (S) **= 99.64%**
- **Add** boron, cadmium, chromium, cobalt, copper, fluorine, iodine, iron, manganese, molybdenum, selenium, silicon, tin, vanadium and zinc. **= almost 100%**
- Over ½ of the human body is made up of (H2O)water (50-70%)
- Some Scientists believe that all heavy elements are coming from super nova explosions.

Those Elements originate from:

- Oxygen = Exploding massive stars
- Carbon = Mostly from dying low mass stars
- Hydrogen = Big Bang fusion (the lightest element)
- Nitrogen = Mostly from dying low mass stars
- Calcium = Exploding massive stars and exploding white dwarfs
- Phosphorus = Exploding massive stars
- Potassium = Exploding massive stars
- **These 7 elements representing 99.1% of you body weight.**

Source: NASA - Goddard Space Flight Center

Elemental Composition of the Sun

Element	% of total atoms	% of total mass
Hydrogen	91.2	71.0
Helium	8.7	27.1
Oxygen	0.078	0.97
Carbon	0.043	0.40
Nitrogen	0.0088	0.096
Silicon	0.0045	0.099
Magnesium	0.0038	0.076
Neon	0.0035	0.058
Iron	0.030	0.014
Sulfur	0.015	0.040

But Humans are more than just Elements listed in the Periodic Table.

- Consciousness may be what differentiates us from animals.
- How would you define consciousness?
- Is consciousness coming from outer space?
- Is consciousness evolutionary?
- Is it an energy and if so, is the energy coming from outer space too?
- What do you think?

What famous People believe:

- **Albert Einstein** had expressed the opinion that matter was nothing more than a form of mind.
- ***Nikola Tesla*** *believed that* "My brain is only a receiver. In the Universe, there is a core from which we obtain knowledge, strength and inspiration. I have not penetrated into the secrets of this core, but I know that it exists."
- French biologist **Louis Lapicque** accepted the presence of a spiritual energy in the human soul.
- **Teilhard des Chardins** believes in the presence of a spiritual power down into the motionless matter.
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Teilhard des Chardins (1881-1955)

- Earth science teaches that at the beginning of the world matter was a gas of undifferentiated energy which then formed matter through energy condensation.
- Teilhard believes that this initial energy (big bang) was of universal nature. In addition, he hypothesizes that any particle of matter (such as an element) holds 2 energies – outer (matter) and inner energy.
- The whole mechanism of **evolution** is based on the dynamic character of the relationship between the material and energy,
- This phenomenon in the earliest matter particles became consciousness through evolution.

Teilhard des Chardins cont'd.

- When humanity progressed from the Stone Age to the Bronze and Iron Ages, finally arriving at the civilization of the Atomic Age, then reflective intelligence alone made that progress
- Teilhard sees the goal and end of evolution on the normal extension of the evolutionary line of the past. So, it is not difficult to understand that the ultimate goal of mankind can be nothing other than the triumph of spirit and consciousness (over the planet Earth).
- Teilhard cannot and does not want to see matter separated from the essential power of spirit. For him, matter and spirit form a whole that is unified and indivisible.

Energy = Mass times speed of light squared

- There is really no mass as some scientists currently understood, only energy.
- So, what is the nature of this energy?
- Princeton Researchers, Robert Jahn and Brenda Dunne have even suggested that on a quantum level there may be no distinction between energy and consciousness.
- Quantum mechanics tells us that the entire universe is a single interconnected **energy movement.** You cannot get outside of this primary field of energy. It is all around you and it forms your body, thoughts and environment.

There is a New Science of Consciousness

- It is about the neuroscience of consciousness : the attempt to understand how the inner universe of subjective experience relates to and can be explained in terms of biological and physical processes unfolding in brains and bodies.
- Consciousness is first and foremost about subjective experience – called phenomenology.
- Consciousness science tries to measure, observe, conclude, repeat – like physicists have been unraveling the secrets of the universe.
- And when life ends, consciousness will end too. Nothing to be afraid of.
- **Interested? Read more in the book “Being You” by Anil Seth.**

Stay Tuned: Starting June 2022 we will know more about outer space. Go for it , Webb Telescope!