**To slide 2:**

This blindingly handsome teenager staring romantically at a telescope is not a young movie star rehearsing a scene for a future movie about contacts with extraterrestrials. He is a lonely Russian boy who, at his age of 7, had already lost both his parents, just before the WW2 - the young father executed by KGB for a fabricated political “crime” and a young mother sent to the labor camp for having an “enemy of people” husband.

**To slide 3:**

The orphan boy managed to survive through the difficult WW2 time, and, 10 years after the war, when his mother returned from exile, he has already graduated from Moscow State University to become a professional astronomer (1955). His outstanding intellectual faculties brought him to the graduate school where he was in luck to get professor Iossif Samuilovich Shklovsky as the scientific adviser – one of the most brilliant human beings of that time. Shklovsky was interested in everything new in astronomy, wrote the first book on then very young radio astronomy, and Kolya became his right hand in radio-astronomical research. Other young colleagues around Shklovsky helped him in the development of other new branches of astronomy – IR, X-ray, gamma. In the early 60-s, after the seminal paper of Cocconi and Morrison was published, Shklovsky contaminated Kardashev and other colleagues and students with his interest in SETI. His book “Universe, Life, Intelligence,” first published in 1962, ignited the imagination of many young people in Soviet Union and abroad (including the presenter).

**To slide 4:**

Eventually, Kolya became the most steadfast promoter of SETI. He often repeated that communication with a developped ET civilization may help us improve the interhuman communication here on Earth, which is currently far from ideal. He himself was an outstanding communicator – patient, modest, respectful to the opponent, and yet firmly principled.

**To slides 5 – 8:**

Some of his communications with others resulted in important collaborations and achievements. Here are a few examples.

**(Slides 6&7)** By the end of 1960s, during his trip to the United States, he met Carl Sagan and proposed to organize a Soviet-American Symposium on CETI (later renamed to SETI). The Symposium took place in 1971, at the Byurakan Observatory, in Soviet Armenia, and it played a crucial role in the fast rise of interest to the SETI problem and in the development of search programs in the Soviet Union, United States, and other countries.

**(Slide 8)** Here are Nikolai Kardashev and Freeman Dyson at the 1971 Byurakan Symposium. Search for hypothetical “Dyson Spheres” will later become one of the major tasks of observational facilities developed under Kardashev’s supervision or conceived by him for the future.

**(Slide 9)** And this example of Kolya’s communication with colleagues doesn’t need my comments. Dr. Maccone can tell us better about this meeting in Moscow.

**To slide 9:**

Especially interesting was Kolya’s communication with his graduate school advisor, later a colleague, and the older friend, Professor Shklovsky. In particular – their polemics on the possible uniqueness of our civilization.

**(comment on what is written on the slide)**

**To slide 10:**

1964 was a special year in Kolya’s professional life. He published a seminal paper “Transmission of Information by Extraterrestrial Civilizations” in the Soviet Astronomicheskii Zhurnal, that was translated into English. The major idea of the paper was based on Nikolai’s persuasion that evolution, development, progress, and expansion are immanent properties of any technological civilization, and progress and expansion require free energy. If the *exponential* growth of energy consumption that took place in the couple of centuries of our technological stage is an immanent property of any technological civilization, than, with today’s, or even a few times smaller increment, the rate of our energy production and consumption will become comparable to the total luminosity of our star in a couple thousand years, and in less than ten thousand years, the energy production will become comparable to the total luminosity of our whole Galaxy. So did Nikolai come to his famous “Kardashev Scale” of civilizations. We are currently a Type 1, or “planetary” civilization, capable of using all the energy available on our planet. Then go the Type 2, or “stellar,” and the Type 3, or “galactic” super-civilizations. The unavoidable thermodynamic *sink* of energy to space in IR domain can be modulated and coded relatively simply, making a Type 2 or 3 super-civilization a very powerful, isotropic transmitter of information. It is such sources that Nikolai suggested to search for, and he devoted his life to improving and specifying his model, and creating technical facilities capable of detecting such sources, proving their artificial nature, and reading the transmitted information.

In the same year of 1964, Nikolai presented these seminal ideas at the first Soviet CETI meeting in Byurakan, which was organized on his initiative and became a rehearsal for the historic Soviet-American meeting of 1971.

**To slide 11:**

In his 1964 paper, Nikolai indicated two radio sources, CTA21 and CTA102 that, judging by their small size and unusually shaped continuous spectra, might be artificial. A quickly growing sensation, including this Isaac Azimov’s publication in NY Times, eventually died away: it was proven that these sources belong to the family of recently discovered quasars.

**To slide 12:**

In this photo you see Kolya, his advisor, Professor Shklovsky, and a young radio astronomer Gennady Sholomitsky who looked for possible variability of these sources. The photo was probably taken close to the peak of the sensation – all the three look happy and excited. But, as Shklovsky himself warned in his book “Universe, Life, Intelligence,” one should be patient in such a fundamental endeavor as SETI. He cited an eastern proverb: “If you are waiting for a dear friend, don’t take the beats of your heart for the clatter of the hoofs of his horse”…

Fortunately, Kolya was not of those who can be easily discouraged by blows of life. He did take the lesson, but he continued to serve his calling with the same boiling energy.

**To slide 13:**

Kolya participated or was the leader of designing and constructing several new facilities for observational astronomy, and he always included some SETI tasks in the future programs of these facilities.

This is RATAN-600. Constructed in 1968-1977. Kardashev participated in the design of this unique facility (together with Pariisky) and he supervised full sky surveys with RATAN-600 in the “water window” (cm and dm) in hopes of finding an artificial ET sources.

**To slide 14:**

RT-70 (Evpatoria). Another RT-70, usable down to 1mm wavelength,
was being constructed on Suffa plato (Uzbekistan) in 1980-s, under supervision of N. Kardashev. The project was not completed because of the break of the Soviet Union.

**To slide 15:**

By the end of 1970s, Kardashev became the pioneer of the space radio astronomy. On the slide: KRT-10, 1979. Attached to the orbital station Salyut 6’s docking hatch.

12-72 cm wavelengths. Accident: at the moment of the separation from the spacecraft, the antenna caught on to some structure and blocked the docking unit. The cosmonauts Ryumin and Lyakhov had to go to the open space to push the antenna from the craft. On this slide: the forced separation of KRT-10 from Salyut 6 by cosmonaut Ryumin, as pictured by an artist.

**To slides 16-19:**

RadioAstron

**To slides 20-21:**

Millimetron

**To slides 22-23:**

Wormholes (work with Novikov)

**To slides 24-25:**

Summary of Achievements

**To slide 26:**

Concluding this brief tribute to Kolya, we state, with sadness, that the earthly path of an outstanding scientist, thinker, and dreamer, Nikolai Semionovich Kardashev, has been completed. His belief in the existence of extraterrestrial civilizations and in the necessity to search for them was based on his persuasion that all of them are highly moral, so that any kind of contact will not bring any harm to our civilization, but will rather be beneficial. How lucky was our civilization that the little boy, deprived of his parents by an evil regime governing the country, did not become embittered and revengeful, but became instead one of the nicest, purest, most intelligent human beings! He dreamt of finding similarly good, or maybe even better, creatures outside our cosmic home. Let us hope that, one day, this dream will come true - for us, or for our descendants. Because, one day, somewhere in another galaxy, a boy, or a girl, with a dreamy blue eyes was born and succeeded in his or her life project of establishing interstellar contact.